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The Stripping of

Dyed Cotton Goods

By C. W. WILSON

THE stripping of dyed cotton goods is a subject of immense importance to every dyer, and I venture to submit my experience in this connection. No originality is claimed for any of the under-mentioned methods, but they represent my experience of certain classes of colors, and possibly some of the information may save someone a little of the worry and anxiety that probably I endured when attempting to put right menders.

Little information is given us on this question of stripping and mending by the color manufacturers, but they could, of course, only carry out a series of trials such as ought to be done by a works chemist on the introduction of a new dyestuff into the works. A chemist's report can only serve as a guide to the practical man. Thus, for example, a chemist will take a pattern off say some goods that have come up too heavy in shade. He will reduce this down in a beaker with hydrosulfite and caustic for perhaps half an hour at 60° C. The shade is considerably weakened, and by topping up with perhaps a little Caledon Orange 2 R.T.S., the goods will be put right! This all sounds so beautifully simple, but try and imitate this in the works, and you will see the very vast difference. I write feelingly on this point, as I know to my bitter experience that where a shade has been successfully stripped in the laboratory in half an hour, it often takes three or our days to produce the same result on the jigs.

On the other hand, it is only fair to recognize that a chemist's trial may often serve as a useful guide in the stripping of dyes and prints. One thing is quite certain. If a certain color will not strip down easily in the lab., then it will not strip down easily, if at all, when attempted in bulk.

At the outset, one must recognize that mending spoilt goods is usually a very expensive procedure, and only as a last resource should the risks of stripping down be attempted. By this, I mean to imply that if a customer will take a lump of cloth that is slightly off-shade at a half-penny per yard reduction (vat dyed), it is frequently the easiest and cheapest way out of the difficulty. In many cases, with the commission dyer or printer, it is cheaper to completely forfeit the whole of the price for dyeing or printing. The principles of this stripping down usually depend on an oxidation or reduction treatment, with the inevitable weakening in the strength of the fabric. It is not always easy to guarantee that a certain cloth will withstand a certain treatment. With poplin cloths especially, I have noticed how they seem to give way in tensile strength all at once. You have only to tender a number of pieces once to appreciate my remarks!

Direct Dyes

It is often concluded that if cloth be dyed with an ordinary direct dyestuff, it may easily be bleached a pure white, and then redyed, but this is far from true. Advice is frequently given about lightly chemicing, or partially soaping down, and afterwards re-dyeing up to the required shade. Practically every attempt I have made at this, I have been forced to bleach down, and re-dye again, and I consider that a complete stripping down is the only really satisfactory way to deal with really defective goods. Generally, mending is carried out on a dye jig. An uneven shade throughout will result if there is a different temperature at the ends while running the batch through, and the usual steam pipe, when working the liquor at the boil, often causes parallel lines to appear from start to finish, which are accounted for

by the small jets of the pipe. When stripping on the jigs, the selvedges appearing darker than the remainder of the piece is a big difficulty. This is the same with all colors, and, when working in the open width, cannot be overcome.

Titanous sulfate or chloride is by far the best way of bleaching down most direct colors, but it is expensive. When worked on a dye jig, a common strength is three pints Titanous sulfate 64° Tw. worked at 40° C. over four to six ends at about 45° C. in a small bath. Five subsequent washes-off are usually sufficient. Tendering may easily occur when worked at higher temperatures or concentrations. Dyes of the Direct Sky Blue G.S. type are not stripped with titanous, but easily bleached to a good white with chemic and acid.

Bleaching liquor of about ¾° Tw., followed by two waters off and a weak acid will strip the majority of pale shades. A few of the faster direct colors, such as Yellow B., or Oxyphenine R. or GG., Fast Red K. will not strip at all by this means. There are many border-line cases where a muddy white or yellow only is obtained, and a subsequent treatment with titanous sulfate is necessary. It is obviously unwise to subject to a bleaching treatment, if the result is at all doubtful. Dyestuffs that will definitely strip easily are: Chlorazol Brown 2 G., Direct Sky Blue G.S., Chrysamine K., Dark Brown B.M., Chlorazol Black B.K.S., Orange 4 R., to mention a few offhand.

Hydrosulfite could, of course, be employed in stripping direct colors, but I hardly consider it necessary or advantageous. It has a nasty habit of reducing the color to an apparent white, and later oxidizing up to a very pale tint.

Basic Dyes

My experience with basic colors is that they are not by any means as easy to bleach down as is generally supposed. It is true that all are readily susceptible to chemic- but stripping completely down, especially with heavy shades, is quite another matter. The tannic acid base has a very persistent way, and I have in several cases bleached down to a muddy white stage, but never been able to re-dye and obtain the necessary brightness. When working on the jigs, the following seems the only really satisfactory method: Boil for one hour in 3° Tw. caustic soda, wash off well, and follow with ¾° Tw. chemic and a sour.

A small kier is often a useful thing to have on a works for menders, but one certainly hopes that the percentage of menders will never be sufficiently large to justify such. A light caustic boil in a small kier is the ideal thing for stripping basic dyes. This completely loosens the mordant, and the dye may very easily be cleared with bleaching liquor.

Vat Dyes

The stripping of vat dyes is a particularly tricky and expensive procedure. Usually, one has to satisfy oneself with a partial removal of the dye, and, as every vat dyer knows, it is often difficult enough to obtain this.

Firstly, indigoid colors can usually be bleached to a poor white, provided an arrangement is fitted up whereby the goods can be kept underneath the liquor for some considerable time. The following represents a reduction mixture such as is often used:

½ gal. Glucose Syrup
1 gal. Caustic Soda 76° Tw.
½ gal. Pyridine

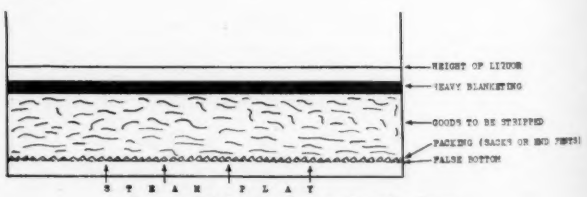
25 gals.

Boil 2½-6 hours.

Alternatively, potassium ferricyanide and caustic soda are often used. After boiling, the goods are well washed off, and given a light chemic and sour.

The writer has carried out many experiments, treating goods in this way underneath the liquor. One of the biggest difficulties by far is obtaining a level result. Below, is a rough sketch of a simple arrangement that I have fitted in our works, and this has given quite satisfactory results. The biggest possible volume is about 80 gallons, and this is capable of holding about 200 lbs. of cloth. Obviously, where there are only small quantities to be stripped, one works with the very minimum amount of liquor. The tank or beck is made of iron and fitted with a false bottom on the principle of a kier.

The bottom is first covered with sacking or end-fents, to ensure that the goods to be discharged are not in direct contact with the steam play. The goods are very carefully plaited into the tank by hand in open width. This operation must be done most carefully to avoid as far as possible any tendency of the cloth to come into rope form, or uneven and patchy effects are sure to result. Over the goods is fitted a heavy weighty blanketing, cut to the size exactly of the box. The liquor is gauged just above this mark, and thus there is no tendency of the cloth to be exposed to the air. A slow constant boil is given, and quite level results are obtained.



Arrangement for treating goods under liquor.

With anthraquinone dyestuffs, the same under-the-liquor arrangement may be worked with advantage, though with these colors, one never dare hope to effect more than a partial removal of the dyestuff. In certain cases, whites can be obtained, but this is not often, and in any case, rarely necessary for vat colors. The following is a mixture I employ:

1½ gals. Caustic Soda 76° Tw.
½ gal. Glucose Syrup

5 lbs. Decamine A.
5 lbs. Hydrosulfite powder.
3 pints Oleine.
½ gal. Pyridine.

25 gals.

Points to note especially are that practically all vat colors go peculiarly flat when boiled in this way. Blues and greens are especially evident, and once that flatness is obtained, it is practically impossible to obtain the original brightness. Reds and pinks can often be brightened with some of the brilliant oranges that are at our disposal. With blues and greens, the solution is not easy, and topping with basic dyestuffs is hardly permitted!

Naturally, with dyeings that are only very slightly too full in shade, such a treatment as this described is not at all necessary. A partial reduction may be carried out by ordinary treatment on the jigs. Note that Caledon Orange 2 R.T.S. has a bad habit of turning yellow on the selvedges when treated in such a way on the jigs

Permanganate of potash exerts a severe action on the cloth when found to give beneficial stripping, and care must be taken to avoid tendering. For usual work, ½ oz. per gallon may be employed with safety. Vitriol must be added. Clearing with sodium bisulfite or boiling oxalic acid is usually employed. The Caledon Jade Greens may be treated in this way with advantage, and with pale shades, a pure white may easily be obtained. Permanganate of potash also exerts a flattening action on most anthraquinone colors.

Azoic Colors

The thousands of different combinations of naphthol colors renders any definite statements impossible, but sufficient must suffice in saying that almost any combinations can be stripped completely down with the decamine mixture given previously for anthraquinone vat colors. Again, it is a great advantage to work underneath the liquor. Frequently, when working in the open width on the jigs, almost a complete white may be obtained, but the selvedges remain dark.

In conclusion, I should like to add that a little more written guidance on the practice of stripping certainly would be appreciated by dyers and colorists. Prevention of menders would be by far the best accomplishment of all, but such can never be expected in a dyehouse.

● DYE IMPORTS

Imports of coal tar dyes in August were somewhat less than for the corresponding month last year but recorded marked advances over July, the quantity being 69 percent heavier while the value advanced 91 percent, according to C. C. Concannon, Chief, Commerce Department's Chemical Division.

The value of such imports in August totalled $489,000 compared with $256,000 for the preceding month and the quantity advanced from 178,350 to 301,200 pounds. The increase was due in part, Mr. Concannon stated, to the receipt of many classes of coal tar dyes that have not entered the country in recent months but largely to heavier purchases of the usual imports.

In value, dye imports since the beginning of 1934 have remained approximately the same as for the first eight months of 1933—at $3,100,000—the quantity, however, has declined from 3,160,000 to 2,125,000 pounds, indicating higher invoice prices due in part to exchange.

Imports of aromatic chemicals continue to decline, only 716 pounds, valued at $1,464, being imported in August; only 17,000 pounds have been entered for consumption since the beginning of the year compared with 28,500 pounds for the first eight months of 1933.

Receipts of medicinals, photographic developers, intermediates and certain other coal tar products since the beginning of the year have declined slightly in quantity to 1,185,000 pounds but the invoice value has increased more than 60 percent to $1,187,000 compared with the first eight months of 1933.

Exports of coal tar and products during the first half of 1934 were valued at $7,400,000, an increase of 23½ percent over the corresponding period of 1933. Of this total, colors, dyes, stains, and color lakes of coal tar origin accounted for $2,906,000, representing an increase of 44 percent in value and 19 percent in quantity compared with the first half of 1933.

● BOOKS

A selection of technical books has been made and compiled in a booklet by the Pratt Institute Free Library in Brooklyn, N. Y.

● NEW SALESMAN

The Kane Manufacturing Co. of Chicago, manufacturers and importers of tapioca flour, starches and gums, has employed Joseph H. Young, formerly with E. F. Houghton and Co., as a salesman in their textile department. Two years ago this company opened a textile department which features a line of soluble oils, sizes, finishes, and a dye penetrant called Dyathol.

● PROMOTION

Edward Rosendahl, technical adviser of the Glyco Products Co., Inc., Bush Terminal, Brooklyn, N. Y., has been appointed Vice-President and General Manager as of September 1, 1934. Mr. Rosendahl, a graduate of the University of Manchester, England, was formerly Professor of Chemistry in the Sassoon College, Baghdad, Iraq.

Textile Uses of Borax*

Its Value in Dyeing, Printing, Degumming and Other Processes

BORAX (sodium borate, biborate, or tetraborate, $Na_2B_4O_7$, $10H_3O$) has been known from very early times, probably from the first century, certainly from the sixteenth century, but it is only within comparatively recent years that the textile industry has made use of its valuable properties. The 1901 edition of "A Dictionary of Dyes, Mordants and other Compounds used in Dyeing and Calico Printing," and other literature of about the same period mentions about three textile applications of borax, but there are now many more.

pH Value

Borax has won for itself a secure little niche in the textile trade, and it owes this position to its mild alkalinity, its unvarying behavior, and the ease with which it can be used to control the alkalinity of a solution. When dissolved in water part of it splits up into alkali and boric acid. A solution in water at the ordinary temperature has a hydrogen ion concentration expressed by the value pH=9.24, and this value decreases slightly with a rise in temperature. At 160 deg. F. the pH=8.86. Except at great dilutions the pH value is not much affected by the amount of borax dissolved, so that borax introduces a great safety factor where an alkaline reagent has to be employed. A very important property is that it will control the alkalinity of, for instance, a solution obtained by dissolving soap in water, the effect being that the pH value of the soap solution is reduced.

The solubility of borax in water rapidly increases with rise in temperature. Thus, at 10 deg. C., 100 grm. of water dissolves 1.6 grm. of borax; at 50 deg. C., 10.5 grm., and at 100 deg. C., 52.5 grm.

Boric, orthoboric or boracic acid, ($B(HO)_3$) also has its textile uses.

One of the most important of boron compounds is sodium perborate ($NaBO_3.4H_2O$), but it is not proposed to deal with it here.

Use in Dyeing

The processes in which borax may be employed are very diverse. In dyeing, borax is a useful addition to the bath in many instances. In the dyeing of alkaline blues on wool, the bath must be slightly alkaline, and it is best to use a safe alkali like borax. The reason for the use of a feebly alkaline liquor is not solely the avoidance of damage to the fiber; the more alkali present the more color is left in the bath, so that in any case it is wise to employ as little alkali as possible.

In preparing the first bath, various alkaline reagents may be used, for example, 1-2 per cent. of soda, or 2-3 per cent. of borax, or 5 per cent. of silicate of soda, or 2 per cent. of ammonia. Borax scores over the others in that it allows of a bigger margin for error, and quantities up to 10 per cent. have been suggested. A mixture of 2½ per cent. of borax and 5 per cent. of soap has also been recommended. The wool is worked in the alkaline bath and the color afterwards developed in an acid bath.

Borax is also used in the application of certain direct dyes to cotton.

Among the most interesting of modern uses are those in connection with the dyeing and printing of vat dyes. The addition of boric acid or borates to the alkaline vat has a buffering action, the alkalinity of the solution being reduced, but not quite neutralized.

Borates in Printing Pastes

In B.P. 367,240, the Sandoz company states that if a certain amount of boron compounds is added to vat printing pastes containing alkali-metal carbonates and bicarbonates a much better reduction of the dyes during the steaming is ensured. On steaming and re-oxidation, much deeper prints are said to be obtained. Borax or boric acid may be used. In one case, a cotton fabric is printed with a paste containing Indanthrene Yellow G Paste, thickening, glycerine, and a small quantity of boric acid. After drying, the prints are steamed and re-oxidized. The printed areas are colored a brown shade after steaming, which after oxidation and soaping becomes a full yellow. The tones are claimed to be considerably deeper than those obtainable by the same method, but without the use of boric acid.

Where there is a danger of acid developing in dyed goods and tendering the fiber, as in the case of sulfur dyes, an aftertreatment which will disperse amongst the fibers some anti-tendering substance is recommended, and a small amount of borax is a suitable agent. If acidity does develop it will at once be neutralized by the alkali.

* Reprinted from the "Dyer."

Degumming Silk

Since by its employment control of the alkalinity of soap solutions is easily affected, borax is extensively used in laundering and in the degumming of silk. The following procedure is suggested for degumming 80 pounds of silk. It is asserted to be safe, uniform and efficient. Twenty pounds of borax is dissolved in 100 gallons of water (bath *A*) and the silk is immersed in this solution, which is maintained at a temperature of 190 deg. F. for three-quarters of an hour. It is then removed and immersed in another bath (*B*) made up of 4 pounds of soap, 2 pounds of borax, 100 gallons of water, maintained at 190 deg. F. for another half-an-hour. The borax solution gives a pH value of 9.24. Some people prefer a solution having a pH value of 10. If desired, this can be obtained by substituting 2 pounds of caustic soda for 2 pounds of borax in bath (*A*).

Oxidizing Agent

Again, it is often desirable to introduce an oxidizing agent, in which case the 2 pounds of borax in (*B*) may be replaced by 2 pounds of sodium perborate. The use of perborate in the second bath obviates wastage through oxygen being used up to oxidize organic matter which had already been dissolved in bath (*A*). This process may be regarded as a single bath boil-off, followed by a rinse, but if desired each can be split up in order to make for continuous operation. The borax also has water softening properties.

In the degumming of silk waste it has been recommended to use per 100 gallons of water, 13 pounds fo soap and 1 pound of borax. In another process 6¼ pounds of boric acid and 4 pounds of caustic soap per 100 gallons of water are employed.

The silk fiber is very sensitive to the action of free alkali, especially at high temperatures, and if there is much present in degumming baths the fibroin is in danger of being attacked as soon as the sericin has been removed. The presence of borax is a guard against damage.

Assistant in Enzymatic Degumming

The degumming of silk by proteolytic enzymes, borax being used as an assistant, was described by Meunier and Vallette in *Russa,* 1930, 4, 1513-1521. The degumming activity of pancreatin is maximal at about pH 8; it has practically no effect on fibroin. The silk is treated for 1 hour with concentrated soap (2 per cent of silk) solution at 100 deg. (silk, silk-cotton) or 50 deg. (silk-cellulose acetate, silk-viscose); the enzyme (750 grm. of pancreatin per 100 kg. of fabric) is dissolved in a buffer solution of pH 8 (borax), which is kept at 37 deg. The goods are treated for 12 hours with a pancreatin solution, which has been used once, centrifuged, rinsed for 1 hour at 100 deg. or 50 deg. with 1 per cent soap solution, and then with water, and centrifuged again.

The Function of Borax

The function of borax in scouring and degumming has been well expressed by a writer in the AMERICAN DYESTUFF REPORTER (March 21, 1927). He states: "The concept of pH and the buffer action have only recently become familiar to investigators in the textile technology. Scouring and degumming both depend primarily on the alkalinity of solution. The greater the pH up to 12 or 13 the quicker the emulsification and removal of impurities. Therefore, in practice the maximum alkalinity which will not injure the fibers is used. Cotton will stand an alkalinity of pH 12 or 13 without being seriously damaged; the soap solution containing soda used in wool-scouring has generally a pH 10 to 11, while the usual neutral soap solution used in degumming has a pH of about 9. Since the alkali is being used up in the process the solution employed must have reserve of alkalinity in the form of a buffer, which will maintain the favorable pH in spite of the loss of alkali, which is continuously removed. Soda, soap, borax are such alkaline buffer substances."

Acetate Silk

Various suggestions have been made for the degumming of real silk in presence of acetate silk. One authority proposes the impregnation of the goods at 75 deg. with a strong solution of Turkey-red oil containing 1-2 per cent of Na_2CO_3 or its equivalent of sodium silicate or borate. The goods are squeezed and allowed to remain overnight. They are then scoured in a 1 per cent solution of soap containing 0.25 per cent Na_2CO_3. In B.P. 306,067, British Celanese, Ltd., and G. H. Ellis state that materials consisting wholly of natural silk or of mixtures of natural silk with cellulose acetate may be degummed by heating with an alkaline liquor containing alkali hydroxides, borates, silicates, phosphates, phenolates, cresolates, soap, or a sulfonated soap or oil, the pH of which is maintained at 10-10.5 throughout the treatment. In B.P. 264,936 the same patentees propose to degum natural silk, or mixtures of it with cellulose acetate, by impregnating the goods with one or more sulfo-fatty acids or their alkali or ammonium salts, such as the familiar sulfonated oils of commerce, to which have been preferably added one or more alkali silicates, carbonates or borates. After standing for some time the goods are scoured with a solution of soap to which may likewise be added with advantage one or more alkali silicates, carbonates or borates. Injury to the cellulose acetate filaments is said to be avoided in this way.

In the laundry industry, borax is used along with soap or soda, and is also employed for removing fruit stains.

H. G. Smolens mentions borax as one of the alkalis which can be used in hydrogen peroxide bleaching, and Taylor in B.P. 286,567 describes a process for bleaching with hypochlorites or chlorine gas in the presence of an alkaline carbonate, with the addition of a weak alkali, such as borax or ammonia.

Fire-Proofing

There are also a number of miscellaneous uses to which borax has been put in the textile industry. It is a component of certain finishing mixings, sizes and printing pastes. A mixture of 70 per cent of borax with 30 per cent of boric acid has been advocated as a good fireproof solution for fabrics, paper and wood. The use of borax is a feature of many processes of wool scouring which have been put forward from time to time. A very different application from all those hitherto described is that outlined by S. R. Trotman, E. R. Trotman, and Wolsey, Ltd., in B.P. 329,766. They have found that when wool is acted upon by borax, under pressure, it delivers up its protein in a slightly degraded form, which is soluble in water, and that this substance has practical use as a glue, as a weighting compound, and for producing a dull finish on artificial silks. Waste wool is utilized.

It will thus be seen, from this brief review, that borax has been the subject of much investigation by textile chemists of late years, and that numerous and widely differing uses have been found for it. It can confidently be said that borax may be used wherever a mild and controllable alkali is required.

● 1935 SPRING SHOE & LEATHER COLORS

Nine new and five repeated shades for women's shoes have been adopted for the 1935 Spring season by the joint committee of tanners, shoe manufacturers and retailers in cooperation with the Textile Color Card Association, it was announced recently by Margaret Hayden Rorke, managing director of the color organization.

The new shades comprise:

Praline Brown—light rich brown, representing a significant new development in the high fashion group.

Cameo—smart light tone suggesting the creamy shell in a cameo. High style for active and spectator sports types, alone or in combination with brown, black, blue, etc.

Belmont Beige—medium creamy beige. A staple color, used principally in combination with brown.

Deertaupe—light taupe of beige cast. A staple shade, used chiefly for combination purposes.

Two brilliant new shades, suggesting the patriotic or national theme in fashion, are expected to have high promotional value. They will be used for sports and general wear in allover shoes, or in combination with each other or white:

Drapeau Red—bright "flag" red.

Clipper Blue—vivid medium blue.

In addition to the above, three pastel tones represent a new high style development in the sports category:

Chamois Yellow—well described by its name. Especially smart in sueded leathers. Alone or in combination with brown, navy or black.

Bleute—pale bluish tint, used alone or in combination, especially with navy.

Tropez Pink—light mauvish pink, used alone or in combination with a darker color.

White, because of its success of the past season, is expected to again repeat its popularity.

Five colors from previous seasons are again recommended, as they continue to sell successfully: *Indies Brown, Marrona, Marine Blue, Bourbon and Fawn Brown.*

The above-mentioned colors will be portrayed in the 1935 *Spring Shoe & Leather Card (Women's)*, with the exception of Bourbon and Fawn Brown, which will be mentioned in the card, but not shown.

For men's shoes, three new and five repeated colors have been chosen. The new shades are:

Turf Brown—a warm lively tone of tobacco cast. Selected because of the growing importance of this type of color in sueded leathers for town, country and collegiate wear.

Heather Grey—new interpretation of medium grey for sports shoes, keying especially well with grey shades in sports togs. To be used for allover shoes, or in combination.

Duna—medium taupe of beige cast, for sports types. Particularly suitable as a combination color.

The repeated colors comprise *Mexitan, Bourbon, London Brown, Hempcord and Sanwood.*

The eight shades mentioned above will all appear in the 1935 *Spring Shoe & Leather Card (Men's)*.

Reserves in Printing (Artificial Resins)

German Patent No. 462,200 (6/VII/'28) — *I. G. Farben-Ind. A. G.*—The process of printing reserves for such work as Batik effects has been carried out heretofore by employment of reserves of waxy nature, or of resins, natural or artificial, which have suffered the disadvantage of being more or less soluble in alkali solutions; when the goods thus printed, therefore, have been dyed in bath containing alkali, such as those of vatted dyestuffs, or of the padding baths in Naphthol AS dyeings, the outlines of the printed reserves will have undergone a loss of sharpness and distinctness. Batik effects upon an indigo ground, e. g., have necessitated the use of the zinc-dust-lime vat, which does not permit continuous dyeing.

Enzymes in the Textile Industry

"L. B."—TIBA 10, 13 (1932).—A continuation of a long and good paper. The present section is more detailed than the preceding part, and deals with pepsinase, the tryptases, peptidases, amidases, oxydases, peroxydases, and hydroxydases, quite fully, as to their specific action in textile properties. A paper worth reading.

Dyeing with Indigoids

D. H.—TIBA 10, 29 (1932).—A paper of one page upon this topic, giving definitely five examples of the proper method of employing these dyestuffs. It originates with the Durand-Huguenin firm (the initials of the "author" are probably those of the firm), and may therefore be relied upon.

Some Properties of Chlorinated Wool*

The Determination of Damage in Chlorinated Knitted Woolen Goods

By S. R. TROTMAN, H. S. BELL and H. SAUNDERSON

THE wearing power of chlorinated goods is determined by a number of factors, the chief of which are: (1) tensile strength, (2) extensibility, (3) modification or degradation of the wool protein, (4) solubility in dilute alkalis and acids, (5) presence or absence of the protective epithelium.

It will be seen that it is difficult to find any single test which will give information about all these factors, and in practice the determination of structural damage is relied on chiefly, the percentage of fibers which show partial or complete absence of epithelial scales when examined under the microscope being returned as "damage." This method is obviously faulty because destruction of epithelial scales is probably the final effect of overchlorination and is preceded by modification of the proteins of the cortex.

As a general rule, a piece of yarn is pulled out from different parts of the fabric, opened out, mounted in water, and examined. Those fibers showing no damage, incipient damage, and much damage are denoted by the figures 0, ½, and 1 respectively. Not less than 100 fibers are examined and the algebraic sum of the allotted numbers calculated to a percentage gives the damage. This method is not altogether satisfactory. Chlorination is often uneven and a few fibers from a large sample may not represent the bulk.

Moreover, owing to incomplete penetration of the chlorination liquor, damage may be greater at the surface of the goods than in the interior. Another objection is the difficulty of identifying incipient damage owing to the fact that only the epithelial scales are considered. If these appear to be intact the absence of damage is presumed although, as noted above, modification of the cortex may have occurred. It is possible to dissolve almost the whole of the cortex without affecting the appearance of the scales.

The tensile strength and elasticity give useful indications but are of no value unless determined on the unravelled yarn.

Attempts to overcome these difficulties have been made, the most important of which is the method of Rimington (J. Text. Inst., 1930, *21*, T 237), which is based on the Pauly reaction of damaged fibres with diazotised sulphanilic acid. In this method 0.1 g. of the wool is wetted with 15 c.c. of a 9% solution of sodium carbonate and 15 c.c. of the diazotised sulfanilic acid solution are added. This reagent is prepared by mixing 10 c.c. of a 10% solution of sodium sulfanilate with 5 c.c. of 8% sodium nitrate solution, then pouring 2 c.c. of concentrated hydrochloric acid down the side of the vessel, mixing by gentle rotation and allowing the mixture to remain for one minute before use. After "exactly" ten minutes the wool is withdrawn, rinsed thoroughly with water, transferred to a test tube, 4 c.c. of 10% sodium hydroxide are added, and the tube is placed in boiling water for "exactly" five minutes. The resulting reddish solution is transferred to a graduated flask and diluted to a definite volume of water. The color of this solution is matched with a 0.1% solution of New Acid Brown S (I.C.I.). When 0.1 g. of wool treated in this manner and made up to a volume of 25 c.c. gives a solution of the same intensity of color as that of the dyestuff in a 0.1% solution the damage is said to be 100 units. The method of calculation used for other values is seen from the following example, where W = weight of sample taken, S = volume of dye solution used, and total volume = 25 c.c. Damage $= 100 \times (S/25) \times (0.1)/W = (S/W) \times 0.4$ unit. This test is rather difficult to carry out since if the conditions given above are varied the results are unreliable. Edwards (J. Text. Inst., 1933, *24*, T 1) found that the dyestuff suggested by Rimington did not match the color of the wool solution at all dilutions and substituted a solution containing 292.5 c.c. of a 0.1% solution of Polar Brilliant Red mixed with 1 litre of the original dye solution. He showed further that the test becomes less sensitive as the degree of damage increases and concluded that it was not likely to replace microscopical examination.

*Reprinted from Jour. Soc. Chem. Ind.

There is another point in connection with the test which requires consideration, namely, the dissolution of the wool in sodium hydroxide solution, which naturally causes decomposition of the protein.

While microscopical examination can never be entirely superseded it would be a great advantage to have some supplementary chemical tests which would, firstly, enable a considerable weight of the sample to be used and, secondly, would give some measure of chemical as opposed to structural damage. Such a method must depend obviously on some well-defined chemical or physical property of chlorinated wool which is capable of being determined quantitatively.

The principal characteristic properties of chlorinated wool (Trotman, J.S.C.I., 1922, *41*, 219T) are: (1) its increased solubility in dilute alkalies and acids; (2) its increased affinity for water; (3) its altered affinity for dyestuffs; (4) its decreased sulfur content, and probably (5) a different isoelectric point.

Of these the isoelectric point and sulfur content are too indefinite to be of much value. The true isoelectric point of wool has never been established and it is probable that it varies with the nature of the wool and the processes which have been applied to it. Although chlorination reduces the sulfur content of wool, its determinatoin would be of little use unless that of the original unchlorinated wool were known also.

It was shown (Trotman, *loc. cit.*) that while unchlorinated or undamaged wool is only attacked to a very slight extent by 0.1*N*-sodium carbonate solution or acetic acid chlorinated wool is dissolved to an extent depending on the degree of damage. The test is made by soaking a weighted quantity of the sample in a definite volume of 0.1*N*-sodium carbonate solution for 12 hours at atmospheric temperature, filtering the liquid through glass wool, and determining the nitrogen in an aliquot part of the filtrate. This can be done either by the Kjeldahl process or colorimetrically by means of the biuret reaction, the color being matched against known quantities of wool or by a standard solution of Alizarin Delphinol SEN and Milling Scarlet B (Trotman and Gee, J. Soc. Dyers and Col., 1932, *48*, 232).

A modification of the test was suggested by Sauer (Z. angew Chem., 1916, *29*, 424), in which 0.5 g. of the sample is treated with 40 c.c. of water, 50 c.c. of 1% hydrogen peroxide, and 10 cc. of 0.5*N*-potassium hydroxide solution for three days at atmospheric temperature. The liquid is then filtered and the dissolved nitrogen determined as before. Dilute (0.1*N*) acetic acid has also a greater solvent action on chlorinated wool than on unchlorinated wool.

The readiness with which chlorinated wool is wetted by water is well known. Over-chlorinated samples wet very rapidly in cold water and acquire a peculiar tripe-like handle. It was shown by one of the authors (*loc. cit.*) that chlorinated wool has a greater regain than ordinary wool and that this increases with the degree of damage.

Dyeing of Chlorinated Wool

The difficulty attending the dyeing of chlorinated wool is also well known. Not only does it dye a deeper shade than unchlorinated wool but it tends to dye unevenly also. For these reasons chlorinated goods are generally dyed before treatment, although this limits the number of dyestuffs which can be used since only those which are fast to chlorine are suitable.

It is assumed, generally that chlorinated wool has an increased affinity for dyestuffs but no detailed work has been published which bears on this point. The authors have made quantitative experiments with scoured wool and the same wool after chlorination in such a way as to produce varying quantities of damage. Both yarn and web were used. They were chlorinated with hypochlorite and hydrochloric acid containing from 1 to 5% of chlorine on the weight of the goods, dechlorinated with sulfurous acid washed, neutralized, again washed, and dried. The dried samples were cut into small pieces which were mixed and stored in air-tight tins. A weighed quantity of this mixture was used for each test. Experiments were made with acid, basic, direct, mordant, and vat dyestuffs.

Acid dyestuffs.—These are naturally of the greatest importance since they are nearly always used for knitted goods. In order to determine the maximum affinity of the treated and untreated samples for acid dyestuffs, indigo carmine was used owing to the ease with which it can be determined by means of a standard solution of potassium permanganate. The following experiments were made.

(1) Samples were dyed with 20% of indigo carmine and 10% of sulfuric acid in flasks attached to reflux condensers for one hour after the temperature had reached boiling point. The liquid was then filtered through a plug of glass wool and the wool washed several times with water. The liquor and washings were then cooled and titrated with 0.01*N*-potassium permanganate solution. The percentages of dyestuff absorbed were:

	(1)	(2)
Untreated wool	9.04	9.75
Chlorinated wool	9.89	10.20

(2) In further experiments the percentage of sulfuric acid was increased to 20. The percentages of indigo carmine absorbed were:

	(1)	(2)
Untreated fabric	14.5	15.82
Chlorinated fabric	15.0	16.06
Over-chlorinated	14.5	—

It will be noted that while moderate chlorination causes an increase in the quantity of dyestuff absorbed, over-chlorination appears to reduce it. This point is illustrated further by the fact that an untreated fabric absorbed 9.80% of indigo carmine, when lightly chlorinated it absorbed 12.50%, and when over-chlorinated 10.20%. Experiments with Azogeranine gave very similar results to indigo carmine, but the figures are not so reliable owing to the fact that a colorimetric method of determination had to be used.

(Continued on page 543)

Washington News Letter

The Code Route to Truth-in-Fabrics

By **WALDON FAWCETT**

NOT solely in the field of resale price maintenance have the resources of the National Recovery Administration been seized upon for the revival of languishing issues of industrial and commercial policy. Textile design protection, so long withheld by the dalliance of the legislative branch of the Government, has been brought nearer to practical realization by the new agency of the administrative branch. Most significant of all the resurrections, however, is the rejuvenation of a crusade that, in the days before the World War, bannered its ideal as "Pure Fabrics".

The action of the NRA Code Authority in requirement of "dyed" specifications in conjunction with correct names of furs has revealed the persistence as well as the strength of the movement for literal labeling which originally expressed its objective as "truth in fabrics." Scanning the Rules recently adopted by NRA Code Administrators under the Retail Furriers' Code, one is struck by the modification of the character of the current demands as compared with the proposals of a quarter of a century ago which contemplated a confession of fabric components approximating analytical labeling, or so-called, "full formula" labeling.

In substance, the NRA stipulation requires that in the designation of a fur, in label legend or advertising, the correct name of the fur must be the last word of the description. If any dye or blend is employed in simulation of another fur the qualification "dyed" or "blended" must be inserted between the name signifying the fur that is simulated and the true name of the fur. Examples included "Seal-dyed Muskrat," "Mink-dyed Marmot" and "Black-dyed Fox". Where the name of a country or place is used to particularize a color, the "dyed" insert is relied upon to enlighten the ultimate consumer, as in the case of "Sitka-dyed Fox".

Observers, who have watched the transition, account the present translation of the movement for informative labeling as the third major step in the progression from the Truth-in-Fabrics program which was the subject, many years since, of prolonged hearings in Congressional Committees. That all-but-forgotten venture, it may be recalled, was not a sole attempt at reform but was but a part of a multiple attack upon static conditions which embraced such variants as the "Pure Paint" Bill and the "Honest Leather" Bill. The fate of the Truth-in-Fabrics measure was shared by the alternatives.

Whatever the individual reader may have thought of the flash in the legislative pan, historians of the industry must agree that it had certain educational consequences. Advocacy was not confined wholly to laymen and Members of Congress. A certain proportion of the textile industry was converted to the principle and there was, here and there, capitalization of the sentiment aroused, as in the case of marketers of proclaimed "Virgin Wool." Repercussions of that barren adventure in Congress were heard in the subsequent efforts to accomplish, via the Federal administrative machinery, what had failed of enactment in statute. The intermediate stage,—the effort for concerted action in industry through Trade Practice Conferences—acquires an enlarged present interest by reason of the responsibility of the Federal Trade Commission, together with the U. S. Department of Justice, for enforcement of contemporary Code compacts.

In the case of the "dye" specification for furs, there is a striking parallel between the present Code-mandate program and the earlier enterprise carried out by means of a "trade practice submittal", or trade-practice conference, as it later came to be called. At a conference in New York in February 1928, at which 90 per cent of the volume of the fur industry was represented, a set of rules was adopted covering the nomenclature, etc. of the dyed product. "Rule I", as adopted by Resolution to become effective immediately, was the counterpart of the present prescription. That is to say, it was required that the correct name of the fur be the last word of the description and be preceded, in all instances of simulation, with the illuminating "dyed" or "blended". Even the illustrative patterns then set before the trade, i.e., "Seal-dyed Muskrat" and 'Mink-dyed Marmot", were the same as today.

Given a nine-tenths conformity to the agreement, as far as lip service was concerned, the question arises why the mutual confessional compact of six years ago has failed to bring the desired results. The answer is found in the limitations which have frustrated so many of the ambitions of Trade Practice Conferences in various commodity lines, viz., the insufficiencies of compliance and enforcement. Two outstanding differences distinguish the earlier plan from the later and are counted upon to enable the later method to prevail where the earlier proved futile.

Under the trade practice conference device, the round table forum of the industry, and the resultant treaty, while inspired from within the industry, were sponsored and nursed by the Federal Trade Commission. The pledge of whole-truth-in-labeling have been taken by more than the required 85 per cent of the producers, there was no attempt to set up within the industry any machinery for "intelligence" and enforcement, such as the modern Code Authority, which constitutes the backbone of the present organization structure. The consequence was that if any conscientious member of the industry detected a competitor in lapses from his labeling obligations his only means of dealing with the defection was to make informal if not formal "complaint" to the Federal Trade Commission, which latter was sole agency of enforcement.

The second shortcoming, which may have helped to bring disappointment in the outcome to the Trade Practice Conference, was in the nature of the contact of the Federal Trade Commission with its implied responsibilities. To begin with, the Trade Commission is a combination of tribunal and police force, with many and diverse routine duties and special obligations,—thanks to Congressional assignments for investigational work. The consequence is that, with the best of intention, the trade body can give only a limited amount of supervisory attention to the course of trade practice in any specific field. Indeed, such scrutiny is apt to wait upon protest from within an industry. Yet more serious is the circumstance that the corrective resources at the command of the Trade Commission under the Trade Commission Act necessitate enforcement-approaches almost wholly on what might be termed the negative side. The trade Commission may summon to court, on pain of a summary Cease-and-Desist order, an individual nonconformist who has forgotten his pledge and is mislabeling his products in a manner that accomplishes unfair trading. But this more or less belated punishment of flagrant transgressions is, of course, a far-cry from a systematic check-up on compliance with Code mandates, which nips neglect in the bud.

If the old-time spirit of truth-in-fabrics evangelism revives in consequence of the policy undertaken by the Code Authority there may be anticipated a reopening of that cleavage which has attended every past discussion of the proper objectives of informative labeling. It is a question, by the by, that has lately provoked controversy in other commodity lanes far removed from textiles, but in which the function of labeling or point-of-sale specification is in dispute. Essentially, the issue is whether the cause of consumer enlightenment is sufficiently served by dye-marks, process-notations, etc., which may be freely interpreted as grade-standards or quality ratings. Or, whether, later, if not sooner, the ideals of truth and frankness should lead to a break-down, say in terms of percentages of ingredients, or component parts, together wtih a correspondingly complete recital of artificial coloring. So far, the Code Authority has answered "No."

Technical Notes From Foreign Sources

Analysis of Alkalies

TIBA 10, 49 (1932).—The question is proposed, in the correspondence column, by a subscriber—"In our specialized finishing and dyeing operations, we use large quantities of chalk, sodium carbonate, and caustic soda. We should like to have an expert chemist give details of the method of analysis and estimation of these substances."

The reply is what we should call an elaborate paper upon the subject. Possibly nothing new is contained in it, though comparisons of methods used in different countries is always interesting. It is not always that experts in the same subject, of different nationalities, and so of marked differences in lines of approach, agree in detail.

After-Chroming of Dyeings Without Alteration of Color

German Patent No. 465,422 (18/IX/'28)—*Kalle & Co. A. G.*—It has long been known that dyeings upon wool or cotton, with substantive dyestuffs, are improved in fastness by aftertreatment with the chromates, formaldehyde, acetic acid, etc. The color of the dyeing, however, is usually altered by such treatment, particularly when the chromates are used. The present process involves treatment of the dyeings with a bath containing a dichromate, an aldehyde, and an acid aluminium salt, at ordinary temperatures. The fastness of the dyeings toward water, decatizing, and ironing is greatly improved. Formic aldehyde is the aldehyde recommended, or at least the one first considered. It is not oxidized to formic acid under the conditions prescribed, or in cold mixtures, previously prepared, of the reacting compounds.—One example is given.

Vat Dyestuffs (Gray to Black)

German Patent No. 466,585 (9/X/'28)—*I. G. Farben-Ind. A. G.*—The products of this patent are alkylated amino-dibenzanthrones. It has already been known that, by simple laboratory methods, alkylation of these amino compounds leads to the formation of vat dyestuffs; e. g., by treatment with ethyl iodide, a product is obtained which dyes cotton bordeaux-red. The present process alkylates by heating the amino-dibenzanthrones with methyl esters of sulfuric acid (not necessarily previously prepared), in the absence of neutralizing agents. In one of the examples given (two are given), 32 parts of methyl alcohol are mixed with 120 parts of concentrated sulfuric acid in the cold, and 20 parts of the amino-dibenzanthrone derived from reduction of the nitro-dibenzanthrone of German Patent No. 402,641 are added, the whole being heated at 170° C. for about 3 hours; then cooled, diluted with water, and the product isolated. The vat of the product is blue, and dyes cotton from gray to black, the dyeings being of excellent fastness.

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists

September 24, 1934

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North Carolina State College Student Section
H. S. Bliven, Chairman; D. B. Hardin, Secretary.

Members should notify the **Secretary** immediately of all address changes

OUTING, SOUTH CENTRAL SECTION

THE summer meeting of the South Central Section was held at the Signal Mountain Hotel in Chattanooga on August third and fourth.

About 100 members of the Southern section were there with their wives and friends. Golf, tennis, swimming and bridge were the various sports, with dancing in the evenings.

On Saturday, sightseeing trips were made to the nearby places of interest including Lookout Mt. and Missionary Ridge. Many handsome prizes were presented to the winners of different contests.

Dick Parks of the Chattanooga Chamber of Commerce extended the welcome to the out of town guests.

Respectfully submitted,

H. B. KIMBRELL, *Secy.*

STANDARD SILK SAMPLES

There have been prepared, under the direction of the Sub-Committee on Fastness of Dyed Silk, standard dyed silk fabrics to represent four classes of fastness to washing—namely, Class I, Class II, Class III and Class IV. These standards have been carefully dyed with the dyestuffs and according to the dyeing methods recommended in the 1931 Year Book.

The A. A. T. C. C. is prepared to furnish sets of these washing standards for a nominal charge which will cover the cost of preparation. It will be possible to accurately grade the fastness by comparing it with the standards after subjection to the standard washing tests approved by this Association. All inquiries concerning these Silk Washing Standards may be addressed to the Chairman of the Research Committee.

Louis A. Olney,
Lowell Textile Institute,
Lowell, Massachusetts.

Proceedings of the American Association of Textile Chemists and Colorists

UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the secretary any vacancies which may occur in their businesses.—H. C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive

Note. Persons who have obtained employment should notify the secretary at once. Prospective employers may file vacancies either with the secretary or the American Dyestuff Reporter.

A-2

Education—B.T.C., Lowell Textile Institute, 1932; also course in typing.

Experience—None to date, interested in quantitative analysis, experimental dyeing, color matching, dye testing and dye identification. Ability to learn quickly and will go anywhere. 23 years old, woman, single.

A-5

Education—B.T.C., Lowell Textile Institute.

Experience—Assistant chemist in carpet mill, dye tester in dye plant, research and analytical work in silk dyeing and finishing plant laboratory, plant chemist and overseer of bleaching in surgical dressing plant, assistant chemist in woolen mill. Age 29. Married.

A-6

Education—Analytical chemistry and dyeing course at Lowell Evening Textile School.

Experience—Three years as print chemist and one year as dye chemist for large print works. Two and one-half years as plant chemist for dyeing, bleaching, printing and finishing plant.

A-B-2

Education—Lowell Evening Textile School, 1917.

Experience—Five years' experience in hosiery dyeing, full fashioned hosiery of silk and cotton and silk, also men's hosiery containing rayon, wool, cotton and celanese. Several years experience in laboratory work. Has also had experience in jig-dyeing of cotton piece goods, slub and top dyeing.

A-B-C-1

Education—Graduate Industrial Chemical Engineer, Pratt Institute—1911.

Experience—One year as plant control chemist, 4 years as laboratory chemist with gas company, 13 years as plant chemist with bleaching, dyeing and finishing plant. (Rayon and cotton piece goods). Formulated processes and put them into plant operation, 1 year as chemist and demonstrator for dyestuff company, 1 year as superintendent colorist with print works printing linen and rayon, 1 year as director of testing laboratory for national dry goods concern.

A-E-2

Education—B.T.C., Lowell Textile Institute, 1933.

Experience—Assistant instructor in chemistry, Lowell Textile Institute. Member of scholastic honorary fraternity.

A-E-1

Education—Ph.D., Univ. of Illinois, studied chemical engineering at Columbia, licensed chemical engineer, New Jersey.

Experience—10 years' experience teaching in colleges, subjects included chemical and textile subjects. Has had broad experience in industrial work including experience in testing materials, research and consulting. Will go anywhere; references.

B-1

Education—Educated and trained in chemistry and calico printing in Glasgow, Scotland.

Experience—Has been with large print works as colorist for 13 years producing first class work on cotton, rayon, wool and silk fabrics. References.

B-2

Experience—Boss dyer with one firm for 18 years, divisional supt. at print works for 1 year, in charge of processing and dyeing of cottons and rayons at large bleachery for 6 years. Prefers bleachery in East but will go anywhere. References.

B-3

Experience—Foreman piece dyer for the past 21 years. Can dye the following; celanese, rayon, cotton lacks, wool, silk and mixed fabrics. Has knowledge of finishing and laboratory work.

B-6

Education—Graduate R. I. School of Design.

Experience—5 years in bleachery, 7½ years as assistant dyer, 2 years as boss dyer and 3 years as superintendent of dyeing and finishing. Married, 33 years old. References.

B-7

Experience—Eight years as boss dyer on skeins and ribbons. Over ten years as chemist and head dyer for a large hosiery mill. Experienced on Silk, cotton, rayon and wool in skeins, ribbons, piece goods and all kinds of mixtures. Willing to go anywhere. Not afraid to work or face responsibility. Can handle help efficiently.

B-8

Education—Chemistry and Dyeing Department, Philadelphia Textile School.

Experience—Eleven years experience as chemist and boss dyer on the following: woolen, worsted and cotton yarn; woolen, worsted and union piece dyes on both ladies' and men's wear; wool, cotton, shoddy and mohair raw stock. Age 33, married, will go anywhere. References.

B-9

Experience—Hosiery dyer with fifteen years' experience on high grade silk hosiery; familiar with all types of machines. Age 43, married. Will go anywhere.

B-12

Education—2 years days at N. Y. U. and 3 years nights studying chemical engineering.

Experience—1½ years asst. colorist, 5½ years colorist. Experienced on vats, commercial and fast colors on cotton and cotton-rayon mixtures. References; age 29; married.

B-13

Experience—Large experience as an assistant colorist chemist in silk printing, dyeing and finishing; also on cotton and wool dyeing. References.

B-14

Education—Rhode Island School of Design.

Experience—Familiar with all classes of wool dyeing. Seven years with large carpet mill as dyer and processor of washed oriental rugs. Will go anywhere, married, 37 years old. References.

B-15

Education—B.T.C., Lowell Textile Institute, 1934.

Experience—Experience in dye house running washers, dye kettles and as a dye weighter.

F-1

Education—Textile Institute, Alexander Hamilton Inst., Extension work at Brown Univ., working knowledge of German.

Experience—Has had executive departmental work with all types of textiles manufacturers. Acquainted with all types of textile machinery, dyestuff application, laboratory practice, cost methods, and checking methods and processes. References.

PROGRAM COMMITTEE, R. I. SECTION

The following Program Committee for the Rhode Island Section has been appointed by the Chairman, Mr. John G. Masson:

Ralph F. Culver, Chairman, Ciba Co., Inc.
William F. Deady, Slatersville Finishing Co.
Robert R. Farwell, E. I. du Pont de Nemours & Co.
Heyward F. Lawton, Borden & Remington Co.
Prince S. Crowell, Enterprise Dye Works.
Walter S. Williams, Mt. Hope Finishing Co.

Respectfully submitted,

R. A. PINGREE,
Secretary

CALENDAR OF COMING EVENTS

Meeting, New York Section, Elm Golf Club, Paterson, N. J., September 28.

Meeting, Philadelphia Section, Penn Athletic Club, October 26.

Annual Meeting and Convention, New York, N. Y., December 7 and 8.

Annual Convention and Meeting

—•—

New York City

—•—

December 7th and 8th

—•—

Start Planning Now

AMERICAN
DYESTUFF
REPORTER

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STATEMENTS

THE continuance of the strike brings forth added violence in some places and peaceful picketing in others. Spokesmen for the employers and union leaders give out conflicting reports as to the number of workers idle. George A. Sloan of the Cotton Textile Institute struck a note of optimism when he declared recently that approximately 193,000 of the 299,000 cotton mill workers who had originally answered the strike call had returned to work. In a published interview last week Mr. Sloan was quoted as having said: "What are the facts? Sixty-five per cent of the men and women employed in the Southern cotton mills when the strike was called are on their looms, spindles and other tasks today. Whole states, Virginia with the largest single cotton mill in the South, Louisiana and Arkansas, have operated throughout the strike without interruption. Oklahoma and Texas each report only one small mill closed. Elsewhere throughout the South, as rapidly as workers, anxious and willing to work, have been assured by State and local authorities of protection against terroristic methods of flying squadrons, mills have opened up."

On the other hand we have statements from Francis J. Gorman, Chairman of the union strike committee, to the effect that union lines are holding their own throughout the strike territory and that the "militarized mill management" would not succeed in breaking the strike. He further stated that although some mills had reopened, only a small number of the employes had actually gone back to work.

General Johnson, NRA Administrator, who recently criticized textile workers for their actions, has been both defended and attacked. The secretary of the American Federation of Labor, Frank Morrison, declared that the administrator's statement concerning labor's attitude was unjustifiable because labor had kept its agreements. He said that the first clause of the agreement the union made with Johnson stated that the "strike order was to be countermanded without the prejudice to the right of labor to strike." Morrison also asserted that all of the union's demands had grown out of conditions that the workers had unsuccessfully tried to settle through the NRA, claiming that thousands of workers had been discharged for exercising their right to organize.

In defense of the administrator's accusations, Henry I. Harriman, president of the Chamber of Commerce of the United States, said that the strike was called in the face of findings by the NRA division of research and planning and that labor which could anytime seek for peaceful revision of the code was attempting to modify the codes by "industrial warfare." He also declared that there was indisputable evidence that the majority of the workers would rather continue working than strike but that they were forced to strike by intimidation and violence.

And so the statements continue on both sides of the conflict and we will leave it up to our readers to decide for themselves just who is right. Perhaps by the time you receive this issue of the REPORTER other developments may have taken place which will have changed the entire picture.

ANNUAL MEETING

THE Annual Meeting and Convention of the American Association of Textile Chemists and Colorists for 1934 will be held in New York City on December 7th and 8th. Complete details are not yet available concerning this event but it is not too early to start making plans to be in the city on those days. The usual fine program of papers will be included, the reports of the various sub-committees working under the research committee, as well as the sociable luncheons and dinners. We wish to impress upon the members of the Association the fact that this meeting is all-important and is well worth the expense involved. The REPORTER will carry further details as they are developed.

● DEPRECIATED CURRENCIES

Depreciated currencies and changing economic conditions have resulted in many modifications in world chemical trade, according to C. C. Concannon, Chief of the Commerce Department's Chemical Division.

While the United States retained its position as the second largest exporter of chemicals, following Germany, during the first half of the current year, it lost its position as the world's chief importer of chemicals to the United Kingdom.

Analysis of trade in chemicals and allied products in countries where data is available for the first half of 1934, shows that all made heavier purchases than during the corresponding period last year, increases in value ranging from 1 percent in Switzerland to 34 percent in the United Kingdom and all such countries except Germany and the Netherlands sold more abroad.

Converted to dollars at the average rate of exchange, Germany's exports of chemicals were valued at $117,700,000 for the first six months of 1934, a decline of 3 per cent compared with the corresponding period last year, while imports increased 15 percent to $43,400,000. Exports of chemicals from the United States increased 31 percent to $61,000,000, and imports increased 29 percent to $46,200, exports from the United Kingdom increased 7 percent to $58,400,000, and imports, 34 percent to $54,200.00; Belgium exports increased 5 percent to $28,500,000 and imports, 15 percent to $22,500,000; Switzerland's exports increased 7 percent to $19,000,000 and imports, 1 percent to $12,500,000.

The Netherlands suffered a considerable setback in exports, the decline being 12 percent to $19,700,000 but its imports increased 25 percent to $28,100,000 compared with the first half of 1933. This reversal has led the Dutch Government to limit the importation of various chemicals which are produced domestically, thus changing its traditional policy of many years.

While depreciated currencies accounted for a considerable part of the value inchreases noted in the chemical trade of the countries mentioned, Mr. Concannon pointed out that the majority had volume increases as well.

The United Kingdom imported larger quantities in raw material lines, such as phosphate rock, pyrites, sulfur, gums and resins, particularly rosin and shellac linseed oil, turpentine, and other industrial chemicals. Among exports, which there were no outstanding changes, coal-tar dyes, enamels and paints, and medicine showed upward trends, and the trade of the United Kingdom with Empire countries, especially Canada and South Africa, was larger.

The United States imports of fertilizers, many industrial chemicals, gums and resins, and camphor were heavier and exports of sulfur, benzol, agricultural insecticides, phosphate rock, paints, and many finished products contributed to quantity increases.

Noteworthy in Germany's chemical trade were heavier receipts of crude raw materials, larger medicinal exports, and an advance of 21 percent in the tonnage of coal-tar dyes shipped abroad.

Copal gum, one of the largest items in the export trade of Belgium, increased considerably, while in the Netherlands imports of cinchona bark from colonies more than doubled.

● STRENGTH TEST

In the September number of Textile Research, Dr. Irving J. Saxl, research director, Waypoyset Mfg. Co., Pawtucket, R. I., presents "A Suggested Standardization of Breaking Strength Tests for Rayon Yarns." He holds that for predicting from laboratory tests how a yarn is going to behave during processing, as far as breakage is concerned, the total amount of breakage which must be expected in processing is more important than an occasional weak spot. Instead, therefore, of standardizing on the mean breaking strength as determined by arithmetical averages of single strand breaking tests, he proposes a procedure, based upon the theory of probability distributions, that will show the probable percentage of a given lot of yarn whose breaking strength will be either in accordance with specifications, or inferior to a specified minimum. The prodecure is explained in detail.

In the same issue are reports of Textile Foundation studies on The Micellar Arrangement in Various Cellulose Fibers, by D. R. Morey, and The Thermodynamics of Swelling by R. L. Steinberger, also the regular abstract section covering scientific textile research throughout the world.

● START OPERATIONS

The Southern Alkali Corporation started on Sept. 14th operation of their new $7,000,000 plant at Corpus Christi, Texas.

This culminates a three-year building program and makes the Southern Alkali Corporation, jointly owned by the Pittsburgh Plate Glass Company and the American Cyanamid Company, the pioneer producers of alkali in the far South.

Ideally located on tide water with raw materials and fuel close at hand, this plant will be one of the country's important producers of Alkalis.

● MEMBER OF CODE AUTHORITY

Victor H. Berman, president of Onyx Oil & Chemical Co., Jersey City, N. J., has been appointed a member of the Code Authority of the Sulfonated Oil Manufacturing Industry, to assist in formulating its plans and policies.

Mr. Berman has also been active in the affairs of the Sulfonated Oil Manufacturers Association since its formation.

Some Properties of Chlorinated Wool

(Continued from page 534)

Commercial goods are practically always over-chlorinated, *i.e.*, contain more than 50% of damaged fibers. In such cases, although the difference in the maximum affinities for acid dyestuffs is not marked, the chlorinated wool always has a slightly deeper shade than the unchlorinated. There is, however, a very noticeable difference in the behavior of the two in the dye-bath. Chlorinated wool dyes much more rapidly than unchlorinated wool. It begins to take up the dyestuff at atmospheric temperatures. With small percentages of dyestuff, commencing at the usual temperature of 140° F., rapid exhaustion occurs, practically no color being left when the temperature reaches the boiling point. The rate at which the dyestuff is absorbed increases with the degree of damage both from a cold and from a boiling bath. This naturally suggests one reason for the uneven colors which are obtained since rapid dyeing is generally faulty. When a sample of chlorinated wool was dyed in a cold bath with Kiton Red G, small quantities of the dyestuff being added from time to time until no more was absorbed, no unevenness could be seen either by the naked eye or with the aid of the microscope. The maximum absorption from a cold bath appears to be about 10 millimols. per 100 g. When the wool is examined microscopically after even a very brief immersion in a cold acidified bath three distinct shades of color are observed. The fibers which are devoid of epithelial scales are seen to be dyed deeply, others in which the epithelial scales are somewhat transparent are dyed lightly, while other fibers are unstained. When chlorinated wool is introduced into a dye-bath at 140° F. the damaged fibers absorb the dyestuff with great rapidity and naturally such rapid dyeing as occurs must tend to cause unevenness. If the chlorinated wool be treated in a similar manner to silk, beginning dyeing in a cold or lukewarm bath and adding the dyestuff gradually, even colors can be obtained.

The neutral-dyeing acid dyestuff act in a similar manner, dyeing damaged fibers rapidly in a cold bath and leaving the undamaged ones unstained. Neolan Red and Neolan Pink behave in the same way as neutral-dyeing acid dyestuffs while Neolan Blue and Neolan Violet dye chlorinated wool in a cold bath containing acid, all leaving unchlorinated wool unstained. These properties of chlorinated and unchlorinated wool might be made use of for the production of two-color effects.

Basic dyestuffs.—Basic dyestuffs act in much the same manner as acid dyestuffs, that is they dye chlorinated wool in an acid bath at atmospheric temperatures while unchlorinated wool is only stained. As in the case of acid dyestuffs, the quantity of dyestuff absorbed increases with the degree of chlorination. When dyed at the boiling point in a neutral bath the chlorinated wool takes up a much greater amount of dyestuff than unchlorinated wool. Thus two samples chlorinated with 1 and 5% of chlorine absorbed 7 and 14% more Methylene Blue respectively from an acid bath than the unchlorinated material. In another experiment 4 g. of untreated wool and 4 g. of wool chlorinated with 5% of chlorine were dyed in a neutral bath at the boiling point and small additions of Methylene Blue were made until no more was absorbed. The quantities taken up by the untreated and treated samples were respectively 0.02 and 0.07 millimol. per 100 g. of fabric.

Direct dyestuffs.—All the direct dyestuffs which were tried dye chlorinated wool from a cold neutral bath, leaving unchlorinated wool nearly white. If the bath be made slightly alkaline with sodium carbonate the chlorinated wool still takes up the dyestuff but the unchlorinated wool still takes up the dyestuff but the unchlorinated wool remains quite white. The method might be used for this purpose. At the boiling point chlorinated wool absorbs considerably more of the dyestuff than unchlorinated wool. Two experiments were made with Chrysophenine. Weighed quantities (2g.) of untreated yarn and the same yarn after treatment with 5% of chlorine were dyed with a known excess of the dyestuff and the residual dyestuff was determined by matching the liquor against a standard solution of Chrysoyhenine. The quantities of pure Chrysophenine taken up were:

	Millimols. dyestuff absorbed per 100 g.	
Untreated yarn	0.15	0.22
Treated with 5% chlorine.....	0.46	0.31

Mordant dyestuffs.—Untreated and chlorinated wool were mordanted with aluminum, chromium, and tin and dyed with hæmatin crystals. In all cases the chlorinated samples gave a deeper shade than the untreated wool and the depth of color increased with the degree of chlorination. The range of shades produced was quite distinct. Moreover, the mordanted chlorinated wool, as in the case of other dyestuffs, takes up the dyestuff at a comparatively low temperature and dyes rapidly at elevated temperatures. The increased depth of color does not appear to be due to a greater absorption of the mordant. Portions of the mordanted samples were analyzed and no difference could be detected. In the case of aluminum the color of the chlorinated samples gradually acquired a brownish tint with increasing quantities of chlorine.

It was found that when chlorinated wool is immersed

in a cold solution of hæmatin made faintly acid with acetic acid it becomes fawn to brown in color according to the degree of chlorination while unchlorinated wool remains nearly white. If the stained samples are scoured for 10 minutes at 100° F. in 100 c.c. of soap solution (2 g. soap, 0.5 g. Na_2CO_3 per litre) the untreated sample becomes white while the chlorinated wool changes to grey. Samples treated with from 1 to 10% of chlorine give a graduated range of colors from fawn to brown. Alizarin Red S gives also a distinct range of colors with unmordanted specimens.

Vat dyestuffs.—It was found that chlorinated wool can be dyed with indigo reduced with sodium hydrosulfite in presence of dilute caustic soda solution from a cold bath.

The fact that chlorinated wool differs from unchlorinated wool in having a marked affinity for dyestuffs at atmospheric temperatures suggested a method for the quantitative determination of the degree of chlorination, or percentage of damage, which does not involve the destruction of the wool as the method of Rimington does. Preliminary experiments showed that acid and basic dyestuffs were the most suitable for this purpose and extended experiments were made with Kiton Red G, indigo carmine, and Methylene Blue.

When chlorinated wool is soaked in a cold acidified solution of Kiton Red G for a short time and examined under the microscope only occasional fibers are found to be stained. When chlorinated wool is treated in the same way, the fibres fall into three quite distinct groups, viz., (1) unstained, (2) lightly stained, (3) deeply dyed. In the deeply dyed fibers the epithelial scales are either destroyed or visibly damaged; in the lightly stained fibers they are visible but in many cases not so well marked as in undamaged wool or those of the first class referred to above. The three classes represent therefore undamaged fibers, those showing incipient damage, and damaged fibers respectively. Staining in this manner is a great aid to microscopical examination. The Pauly reagent, which is said to answer the same purpose, was found by Edwards (*loc. cit.*) to be unsuitable since it stains practically all fibers to some extent.

Two examples of the microscopic use of Kiton Red G may be given (Table I).

If examined by the ordinary microscopical method the damage returned would probably have been less, since it would be difficult to say definitely whether the lightly stained fibers were damaged or not. It is obvious, however, that some chemical or physical change must have taken place which affects their affinity for the dyestuff. This may be depolymerization or even incipient hydrolysis of the protein. Further experiments showed that the most characteristic results were obtained when a solution of the dyestuff in 0.005*N*-hydrochloric acid was used. The depth of color produced increases to some extent with the concentration of the dyestuff, but the difference between unchlorinated and chlorinated wool is unaffected. Experiments with fabrics and yarns containing increasing percentages of damage indicated that the quantity of dyestuff absorbed was directly proportional to the damage. Since this is the case it is evident that a quantitative determination of the dyestuff absorbed under standardized conditions should give a measure of the damage. If so, the test should be useful since one could use a comparatively large weight of the sample to be tested.

Samples of yarn and web were chlorinated with known percentages of chlorine, dechlorinated with sulfurous acid, washed, neutralized, again washed, and dried. The dry material was cut into small pieces, which were well mixed and kept in air-tight tins. The dyestuff was analyzed and a standard solution containing a known weight of pure dyestuff prepared. The experiments were carried out in stoppered bottles. A weighed quantity (1 to 2 g.) of the prepared sample was wetted in the bottle with a known volume of water. After cooling, the acid and dyestuff were added, the final concentration of the former being 0.005*N*. After 3 hours the unabsorbed dyestuff was determined by matching against a standard solution of the dyestuff. Experiments were made first with different concentrations of the dyestuff with both untreated and chlorinated samples. The results of these are given in Table II.

Table I

	Wool chlorinated with 1% Cl	5% Cl
Unstained fibers	37	6
Lightly-stained fibers	54	40
Dyed fibers	9	54
	100	100
Calculated % damage	36	74

Table II

Scoured and treated yarn.	1-g. sample, 50 c.c. 0.005*N*-HCl Millimols. dyestuff used per 100 g.	Millimols. dyestuff absorbed per 100 g.
Untreated	0.05	0.016
Chlorinated 1% Cl	0.05	0.035
Chlorinated 5% Cl	0.05	0.050
Untreated	0.10	0.040
Chlorinated 1% Cl	0.10	0.070
Chlorinated 5% Cl	0.10	0.100
Untreated	0.25	0.095
Chlorinated 1% Cl	0.25	0.182
Chlorinated 5% Cl	0.25	0.250
Untreated	0.45	0.112
Chlorinated 1% Cl	0.45	0.360
Chlorinated 5% Cl	0.45	0.450
Untreated	1.0	0.20
Chlorinated 1% Cl	1.0	0.50
Chlorinated 5% Cl	1.0	0.82

It will be seen from the figures given that although the quantity of dyestuff absorbed by the untreated wool increases with the concentration of the dye solution, the difference between the untreated and treated samples is very distinct at all concentrations, and that the absorption increases with the degree of chlorination. The method was applied next to a set of samples of web treated with different quantities of chlorine and in which

the damage had been determined by microscopical examination. In this case 1 millimol. of dyestuff per 100 g. was used. The results of this experiment are shown in Table III.

Table III

	% Cl absorbed in chlorination	% damage	Millimols. dyestuff absorbed per 100 g.
E1	0.57	13	0.60
E2	0.95	17½	0.63
E3	1.17	20½	0.77
E4	1.60	25½	0.79
E5	2.04	30½	0.81
E6	2.13	31½	0.84
E7	2.92	41	0.88

As a result of these and further experiments it was concluded that the best conditions for the test are as follows: 2 g. of the sample are treated for 90 minutes at atmospheric temperature with 100 c.c. of 0.005*N*-hydrochloric acid containing $(0.5 \times 2)/100$ millimol. of Kiton Red G, that is 0.5 millimol. per 100 g. of wool. The liquor is then filtered through glass wool and an aliquot part of the filtrate matched with a standard solution of dyestuff containing 0.01 millimol. per litre. It is advantageous to unravel web before testing.

Comparative tests were now made under these conditions, with different treated and untreated materials. The results are given in Table IV.

Table IV

	Millimols. dyestuff absorbed per 100 g.			
	Untreated	1% Cl	5% Cl	10% Cl
Yarn I	0.140	0.400	0.500	—
Yarn II	0.180	0.340	0.425	—
Web I	0.175	0.363	0.500	—
Web II	0.187	—	0.438	0.415
Web III	0.150	0.375	0.475	—

Table V gives the results of tests made on samples of commercial web and yarns together with the percentages of damage determined by microscopical examination of the dyed samples. In calculating this, lightly-stained and deeply-stained fibers are taken respectively as ½ and 1. These results indicate clearly the ability of the method to distinguish between good and bad samples. It will be noted, however, that for percentages of damage exceeding 50 the absorption of the dyestuff does not increase proportionally. The same is true of the Pauly reagent. This is not of great importance since any fabric showing 50% of damage must be regarded as deficient in wearing power. The limits of absorption for untreated samples are from 0.140 to 0.187 millimol. per 100 g. with a mean value of 0.162 millimol. The maximum percentage of damaged fibers for a well chlorinated sample is from 25 to 35%, which corresponds to an absorption of 0.25 and 0.35 millimol. per 100 g. respectively. When the absorption reaches 0.4 millimol. per 100 g. over-chlorination is probable, while an absorption exceeding 0.4 millimol. is conclusive evidence of at least 50% of damage. Although 90 minutes is given as a suitable time to allow for absorption of the dyestuff it may be shortened without affecting the results materially, as will be seen from Table VI.

Table V

	Millimols. dyestuff absorbed per 100 g.	Unstained fibers	Lightly-stained fibers	Deeply-stained fibers	% damage
Untreated yarn	0.143	80	16	4	12
Chlorinated yarn	0.250	67	24	9	21
Chlorinated web	0.370	60	30	10	25
Chlorinated web	0.250	53	42	5	26
Chlorinated web	0.325	39	51	10	35½
Chlorinated web	0.361	37	53	10	36½
Chlorinated web	0.486	38	44	18	40
Chlorinated web	0.464	43	30	27	42
Chlorinated web	0.484	34	44	22	44
Chlorinated yarn	0.482	29	50	21	46
Chlorinated web	0.487	17	73	11	47½
Chlorinated web	0.497	35	34	31	48
Chlorinated web	0.475	14	66	20	52
Chlorinated web	0.497	20	56	24	52
Chlorinated web	0.496	27	40	33	53
Chlorinated web	0.459	17	52	31	55
Chlorinated yarn	0.496	21	47	32	55½
Chlorinated yarn	0.499	7	40	53	73

Table VI

	Absorption in 15 min.	90 min.
1	0.115	0.143
2	0.375	0.486
3	0.465	0.497
4	0.375	0.484
5	0.454	0.496
6	0.375	0.482
7	0.482	0.496
8	0.490	0.498

The maximum absorption of chlorinated wool containing more than 70% of damaged fibers was determined by treating 2 g. at atmospheric temperature with successive quantities of Kiton Red G until no more was absorbed. Two different samples gave 10.5 and 9.5 millimols. per 100 g. respectively.

It is necessary to remember that commercial acid dyestuffs containing a considerable proportion of salts and moisture. These must be determined and allowed for in preparing the standard solution. The sample of Kiton Red G used for the above experiments contained moisture 2.31, salts 74.61, dyestuff 23.08%.

Experiments with Indigo Carmine

It was thought that the substitution of indigo carmine for Kiton Red G would be an advantage since it can be determined accurately by titration with standard potassium permanganate solution. Preliminary experiments showed that its affinity for chlorinated wool is similar to that of Kiton Red but a greater staining of the unchlorinated wool occurs which increases with the concentration of the dyestuff. As an aid to microscopical examination it is not therefore so useful. Quantitative experiments were made in the same way as described above, except that the residual dyestuff was determined by titration with 0.01*N*-potassium permanganate solution. In each experiment 2 g. of wool were used and soaked in 100 c.c. of the dyestuff solution containing sufficient hydrochloric acid to give a concentration of 0.005*N*.

The concentration of the dyestuff and the time of action were varied at first in order to establish the most suitable conditions of procedure. In the first set of experiments 0.59 millimol. of dyestuff was used per 100 g.; time 15 minutes. Untreated yarn absorbed 0.099 millimol. of dye per 100 g., yarn treated with 1% of chlorine absorbed 0.512 and with 5% 0.585 millimol.

In the next set of experiments, 2 millimols. of indigo carmine were used per 100 g.; time 4 hours, and the samples were examined microscopically. The results are given in Table VII.

Table VII

	Millimols. dyestuff absorbed per 100 g.	Unstained fibers	Lightly-stained	Deeply-stained	% damage
Untreated web F..	0.61	73	24	3	15
Web treated with 0.5% Cl	0.92	67	24	9	21
Web treated with 1% Cl	1.60	33	30	37	42
Web treated with 3% Cl	1.78	26	31	43	58½
Web treated with 10% Cl	1.81	30	20	50	60
Commercial web ..	1.68	33	26	41	54
Untreated crossbred web	0.51	76	9	15	19½
Untreated yarn unlocated	0.52	84	10	4	9
Yarn treated with 1% Cl	1.89	27	44	29	51

It will be noted that a considerable proportion of the untreated fibers is stained lightly with indigo carmine, whereas when Kiton Red G is used, as noted above, only occasional fibers are stained and in these the epithelial scales are either absent or partly destroyed. It was thought that indigo carmine might be sensitive to alkaline damage. Some yarn was treated with 0.1*N*-sodium hydroxide, dried, and tested with Kiton Red G and indigo carmine. In the first case no staining was observed except in those fibers in which no epithelial scales were present. In the case of indigo carmine the affinity for the dyestuff was unaltered.

Three samples were treated with both indigo carmine and Kiton Red G and examined microscopically. The results obtained are given in Table VIII.

Table VIII

	Unstained fibers	Lightly-stained	Deeply-stained	% damage
Kiton Red G	53	42	5	26
Indigo carmine	28	50	22	47
Kiton Red G	39	51	10	35
Indigo carmine	31	40	29	49
Kiton Red G	37	53	10	36.5
Indigo carmine	12	56	32	60

It is evident there is a difference in the indications given by the two tests, but nevertheless in each case the absorption increases progressively with each degree of chlorination.

In the next experiment several untreated materials were tested together with one chlorinated with 10% of chlorine, using 2 g. of wool and 2 millimols. of indigo carmine per 100 g.; time of treatment (overnight) 15 hours.

As will be seen below, the last-named exhausted the dyestuff completely: untreated web absorbed 0.87 millimol. of dye per 100 g., untreated yarn 0.72, untreated crossbred web 0.51, untreated fine count yarn 0.72, untreated 2/45 yarn 0.35, untreated coarse yarn 0.87, chlorinated web 2.00 millimols. In another experiment 2 g. of wool were treated with 3 millimols. of indigo carmine per 100 g. for 8 hours. Untreated yarn absorbed 0.54 millimol. of dyestuff per 100 g., yarn treated with 1% Cl absorbed 2.13 and yarn treated with 5% Cl 2.52 millimols.

Again, when 2 g. of wool were treated with 10 millimols. of indigo carmine per 100 g. for 15 hours (overnight), the millimols. of dyestuff absorbed per 100 g. were: untreated web 1.82 web treated with 1% Cl 5.25, web treated with 5% Cl 6.91, web treated with 10% Cl 5.04, commercial treated web W 4.91, commercial treated web E3 6.89, untreated crossbred web 1.66, untreated yarn 1.59, yarn treated with 1% Cl 4.85, yarn treated with 5% Cl 6.87, untreated yarn (fine) 1.59, untreated yarn (coarse) 1.16. When the quantity of indigo carmine was increased to 12.5 millimols. per 100 g., with a time of treatment of 15 hours (overnight), millimols. of dyestuff absorbed per 100 g. were: web untreated 1.625, with 1% Cl 5.875, with 5% Cl 6.900.

The set of chlorinated webs (Table III) were tested also under these conditions and gave the following results: millimols. dyestuff absorbed per 100 g.: E2 4.175, E3 5.500, E4 6.250, E5 6.350, E6 6.400, E7 7.125. It will be observed in these samples that the dyestuff absorbed increases directly with the damage.

The results of these experiments show that at all concentrations of the dyestuff the degree of chlorination can be determined from the indigo carmine absorbed, but that the figures obtained are higher than in the case of Kiton Red G owing to the fact that the proportion of lightly stained fibers is somewhat greater. It will be seen, however, that untreated materials even when a comparatively high concentration of indigo carmine is used do not take up more than 1.82 millimols. per 100 g. in 15 hours. The best results were obtained when the concentration of the dyestuff was 2 millimols. per 100 g. of wool (see Table VII), and the time of action four hours.

The experiment is carried out in exactly the same manner as with Kiton Red G, viz., 2 g. of the sample (cut into small pieces or unravelled in the case of web) are soaked for four hours at atmospheric temperature with 100 c.c. of indigo carmine solution containing 0.04 millimol. of indigo carmine and sufficient hydrochloric acid to give a concentration of 0.005*N*. At the end of 4 hours the liquor is filtered through a plug of glass wool and the wool washed several times with cold water. The filtrate and washings are acidified with sulfuric acid, diluted to 500 c.c. with cold water, and titrated in a porcelain dish with 0.01*N*-potassium permanganate solution (1 c.c. = 0.00116 g. indigo carmine). Time may be saved without affecting the results sensibly by titrating an aliquot part of the first filtrate.

It will be seen from Table VII that an untreated material does not absorb more than 0.61 millimol. of indigo carmine when treated by this method, while an absorption of 1 millimol. per 100 g. may be regarded as the maximum for a well chlorinated fabric. A comparison of the results obtained with Kiton Red G and indigo carmine is given in Table IX.

Table IX

% damage	Millimols. Kiton Red G absorbed per 100 g.	Millimols. indigo carmine absorbed per 100 g.
25	0.370	1.614
42	0.460	1.916
47.5	0.488	1.940
48	0.497	1.976
52	0.475	1.926
55	0.459	1.904

It may be noted that the absorption of indigo carmine, like that of Kiton Red G, decreases when the percentage of damage exceeds 50.

Basic dyestuffs.—Chlorinated wool is dyed by basic dyestuffs from a cold bath in the presence of acids. Different basic dyestuffs have different dyeing affinities, but Methylene Blue was found to give good results. The greatest contrast in color was obtained with 1 to 2% of tartaric acid or 0.01*N*- to 0.004*N*-hydrochloric acid containing from 0.1 to 0.2 millimol. of dyestuff per 100 g. of wool. Absorption is complete in about 3 hours. Quantitative experiments were made with untreated and chlorinated samples. These indicated that under similar conditions both absorb a practically constant quantity of the dyestuff. The same absorption was given with both hydrochloric and tartaric acids and the quantity of dyestuff absorbed at the boiling point was the same as at atmospheric temperatures. It was found that in all cases wool treated with from 1 to 2% of chlorine absorbed more dyestuff than that treated with from 3 to 10%. The average figures obtained from several experiments being: untreated wool 26%, 1% Cl 79%, 3% to 10% Cl 67%. The following figures (Table X) were obtained with different materials using 0.1 millimol. of dyestuff per 100 g.

Table X

Material	Millimols. dyestuff absorbed per 100 g.	Millimols. dyestuff absorbed per 100 g. after chlorination
Web (1)	0.055	0.089
Half hose	0.050	0.089
Yarn	0.050	0.075

It will be seen that the figures obtained under the same conditions are fairly constant. The web was tested also in presence of 2% of tartaric acid. The figures obtained were 0.050 and 0.089 for the untreated and chlorinated material respectively while at the boiling point they were 0.050 to 0.070.

Table XI shows the effect of increasing quantities of chlorine on the absorption.

The reduction in the absorption with the higher percentages of chlorine is distinctly marked. Malachite Green was found to act in the same way as Methylene Blue. Owing to the decrease in the absorption which accompanies increase in damage the use of Methylene Blue would not be suitable for determining the degree of chlorination, and since Malachite Green acted in the same way the experiments were not carried further.

Table XI

	Millimols. dyestuff absorbed per 100 g.			
	Web	Web	Yarn	Web
Untreated	0.050	0.060	0.050	0.070
1% Cl	0.150	0.160	0.165	0.162
3% Cl	—	—	—	0.146
4% Cl	0.134	—	—	0.150
5% Cl	0.136	0.040	0.140	0.118
10% Cl	0.126	—	—	0.120

Affinity of Chlorinated Wool for Water

Experiments were made with untreated and chlorinated wool in order to test the relationship between the degree of damage and the affinity for water. Weighed portions of the samples were soaked in distilled water for 12 hours at atmospheric temperature. They were then centrifuged and weighed, and the increase in weight was calculated to a percentage on the dry sample. It was found that chlorinated samples had an increased affinity for water in all cases, but this increased affinity did not vary directly with the damage; thus the following figures were obtained for % water retained: untreated yarn 31.0, 28.0; untreated web 34.2, 31.9; chlorinated yarn 50% damage 36.0; chlorinated web 25% damage 34.3, do. 42% 35.7, do. 47.5% 40.7, do. 48% 39.3, do. 52% 37.3, do. 55% damage 35.7%. It is of interest to note that while the affinity for water increases slightly with a moderate degree of chlorination it decreases with overchlorination.

Action of Alkalies on Chlorinated Wool

It has been noted above that chlorinated wool is more readily attacked by solutions of alkalies than is uncholorinated wool. This is preceded by considerable swelling and the wetted sample retains more water than it does in the absence of alkali. Quantitative experiments were made in the following manner: 2 g. of the sample were wetted with 50 c.c. of water in a stoppered bottle, 50 c.c. of *N*-sodium carbonate solution were then added, and the bottle was closed and left for 12 hours at atmospheric temperature. The samples were then removed, centrifuged, and weighed. The liquid was filtered through glass wool and the nitrogen in 50 c.c. of the filtrate determined by the Kjeldahl method. The results of these experiments are given in Table XII.

Table XII

	% 0.5*N*-Na_2CO_3 retained	% Dissolved nitrogen
Untreated yarn	42.0	0.084
Untreated web	39.8	0.030
Chlorinated web 25.0% damage	53.3	0.243
Chlorinated web 42.0% damage	44.0	—
Chlorinated web 47.5% damage	76.0	0.318
Chlorinated web 48.0% damage	49.3	0.187
Chlorinated web 52.0% damage	76.7	0.421
Chlorinated web 55.0% damage	68.7	0.318

Technical Notes From Foreign Sources

Halogenated Vat Dyestuffs

German Patent No. 468,988 (3/XII/'28)—*I. G. Farben-Ind. A. G.*—The dyestuffs here treated are of the benz-dianthrone series. The first method cited consists in the halogenation of meso-anthradianthrone or its derivatives, using either free halogen or substances evolving halogen, in the presence or absence of catalysts, preferably, though not necessarily, in the presence of solvents or suspension-media. Another specification starts with the products of German Patent No. 457,493 (allo-halogeno-meso-naphthodianthrone or its derivatives treated with alkalies), halogenates them, and then condenses them by treatment with acid condensing agents, such as aluminium chloride, in the presence or absence of solvents or suspension-media, or exposes them in an acid solution to the action of oxidizing agents or light(!). Still another specification starts with the products of German Patent No. 456,583 (treatment of 2-2'-dimethyl-meso-benzdianthrone or its derivatives, treated with alkalies), and treats them with halogen in excess. Five examples are given. The products are mostly orange or orange-red vat dyestuffs, of deep shade, and excellent affinity for cotton. The vats are blue-violet.

Vat Dyestuffs and Intermediates (Anthraquinone Series)

German Patent No. 467,496 (26/X/'28)—*I. G. Farben-Ind. A. G.*—Formaldehyde is condensed with a-amino-anthraquinone or its derivatives, in the presence of acid condensing agents, to form compounds from which the formaldehyde is not split off again easily (the case when the amino-compound and formaldehyde alone are merely reacted together). These condensation-products are then variously oxidized. A modification oxidizes a mixture of the a-amino-anthraquinone or its derivative, and at least two or more molecules of formaldehyde, without previous condensation. The products so obtained are all interesting; some of them are valuable vat dyestuffs without further working up. The oxidation is most characteristically carried out with manganese dioxide, lead peroxide, etc., in sulfuric acid of different concentrations.

Six detailed examples are given. The products which are vat dyestuffs are of strong color-tone.

Vat Dyestuffs (Dibenzanthrone Series)

German Patent No. 465,988 (27/IX/'28)—*Gesells. f. Chem. Ind. in Basel.*—By halogenation of violanthrone, dyestuffs containing halogen are produced, which dye cotton bluish-violet. The dyeings are more strong than those obtained with the original violanthrone, but on contact with water assume a pronounced red shade. The present patent describes the chlorination of violanthrone, at temperature over 80° C., in the presence of suspension agents which are immiscible with water, until at least three atoms of chlorine enter the molecule. The products are fast to water, and dye cotton a navy blue.

The example given describes the suspension of 50 parts of violanthrone in 1000 parts of nitrobenzene, and treatment at 135° to 140° C., with a stream of chlorine. The mixture at first becomes thick, then thinner as chlorination progresses. On cooling, the reaction-product is filtered off, washed with nitrobenzene, and the residual nitrobenzene removed with steam. The product is a dark-colored powder, soluble in sulfuric acid with a violet color. Its vat is greenish-blue, with a blue bloom.

Azo Dyestuffs for Acetate Silk

German Patent No. 469,513 (13/XII/'28)—*Kalle and Co. A. G.*—The disadvantage of azo dyestuffs containing carboxyl or sulfonic acid groups for solubilization is, that the presence of these groups depresses the colortone of the product in dyeing upon acetate silk. The present patent employs picramic acid, diazotized, as the first component, and any desired amine or phenol as the second component. Such couplings are soluble in water and powerful in the tones produced upon dyeing. As the sodium salts, they do not decompose in air, as ordinary phenolates do (from the atmospheric CO_2), owing to the stabilizing action of the o-p-nitro-groups in the picramic acid radical.

Four examples are given.

Determination of Glycerol Content of Fibers, Bands, Sheets, etc., with the Interferometer

A. von Schluetter—Kunst-Seide 14,367 (1932).—The percentage content of glycerol in the artificial fibers, etc., is commonly determined by extracting the glycerol with water, under any suitable quantitative conditions, and examining the extract in the refractometer; a method which does well enough when fairly large samples of the material are taken, and a reasonably high content of glycerol in the extract is secured. As the values obtained by the refractometer with fairly dilute solutions of glycerol involve a possibility of error more than 1/10%, the method does not permit sufficiently accurate results to be obtained in all cases. The difficulty, of course, does not lie in the method of preparing the extract for examination.

There are also two gravimetric methods sometimes employed, which appear to afford absolute accuracy, until they are tested and checked. One of them consists in extraction of the sample (weighed, of course) with alcohol, the evaporation of the alcohol, and weighing of the residual glycerol. The other consists in extraction of the weighed sample with water, and calculating, from the bone dry weight of the sample, before and after extraction, the loss in weight, due to the glycerol originally present. Each method is tedious and in practice not exact, the factors of

hygroscopicity, and of the possible presence of other soluble matter, complicating the results.

The present method, in general, consists merely in extracting the material with water under standard conditions, determining the value in glycerol by examination of an aliquot part of the extract in the interferometer, and referring the readings to a graph constructed for the various glycerol-water percentages.

Five grams of the material, cut up into bits and weighed exactly to five grams, are placed in a wide-mouthed dry graduated flask of 250 cc. content, about 170 cc. of distilled water and a few ebullators (Siedesteinchen) added, and the mixture heated carefully to incipient boiling, over a gas flame. As the water begins to boil, the flask is carefully shaken about, and just as actual boiling begins is removed from the flame, to avoid loss by boiling over. The flask is now closed with a rubber stopper, shaken strongly, and allowed to stand for 10 minutes with frequent shaking. The flask is then opened, filled to the graduation with cold distilled water, and cooled to room temperature (20° C.) by immersion in cold running water. Any bubbles entangled in the material are now dislodged by careful shaking, and the contents finally brought up to the 250 cc. mark with more cold distilled water.

The contents are now well shaken, and filtered through a fluted filter. The first part of the distillate (about 50 cc.) is rejected, as any finely divided material (filter-paper fibers, etc.) will be contained in it. The rest of the filtrate, about 200 cc., is collected in a dry Erlenmeyer flask, and the flask stoppered. (The ebullators—bits of pumice, anthracite, etc.—and the stoppers must be carefully boiled out several times before use, to make sure that no foreign substance is introduced into the extract from them.)

The extract is now examined with the Zeiss Liquid-Interferometer. The filtered extract is filled into the 4-cc. chamber, and the reading taken according to directions furnished with the instrument. A blank is run also, with distilled water (or see below on this topic), and its value on the scale is subtracted from the value found for the extract. The remainder is multiplied by the factor F (see below), when the product gives the percentage value of the glycerol in the solution. This result, multiplied by $\frac{250}{5.00}$, or 50, gives the glycerol content of the sample in percentages. I. e., (total reading minus blind value) $\times$ F $\times$ 50 = % of glycerol in the sample.

The factor F is derived from a glycerol-water-mixture graph, and in the case of solution-percentages of glycerol in the range of 0.2-0.4%, which corresponds to about 10-20% of glycerol in the material, may be taken as a constant, 0.000392. The graph referred to is derived by actual measurement of various glycerol-water mixtures, plotting the %of glycerol against the readings of the interferometer.

For percentages of 0.1% of glycerol in the solution, or 0-50% of glycerol in the material, Dr. K. Fabel has determined the value of the constant F for readings ranging from 0-100 (F = 0.000340) up to 2900-3100 (F = 0.000360). The values rise to a maximum toward the middle of the table (or 400-950, F = 0.000392), sinking again gradually from that point on.

The method is stated to be very satisfactory; parallel readings differ by as little as 0.25% of glycerol, based upon the material.

The blind value is best determined, not with distilled water, perhaps, but with an extract of a sample of goods known to be free from glycerol, as there are often salts, soluble material, etc., present in the sample. It is understood that no other water-soluble substance beside glycerol may be present, otherwise the method will require modification.

Enzymes in the Textile Industry

"B"—TIBA 9, 1051 (1931).—The first part of a general discussion of the subject quoted.

The Higher Alcohols in the Textile Industry

"L. B."—TIBA 9, 1059 (1931).—A general review of the topic, interestingly written, as most French articles are, upon any topic. A valuable summary of the subject, as far as it has been developed at present.

Up to the very recent present, so to speak, the process of catalytic hydrogenation has dealt mostly, in the technical field, with the reduction of liquid fats, containing unsaturated linkages, to the saturated form of solid fats, more suitable for the manufacture of soaps, and for use in foods or their preparation. Quite recently, a German firm has extended the process to the transformation of saturated or unsaturated fatty acids to saturated higher fatty alcohols, of the range of C_{10} to C_{16}. It has been known for years. as an item of laboratory interest, that such a reduction of the carboxyl group is possible, and work has been done, on the laboratory scale, upon the subject. The process now under review hydrogenates the materials with hydrogen at a pressure of 100 atm., at temperatures above 300° C., in stirring-autoclaves of V2A steel, using copper catalysts. Metallic copper precipitated upon asbestos, or chemically pure basic copper carbonate, work best. Nickel catalysts, under the conditions employed, are too active, and reduce the compounds to the corresponding hydrocarbons. Aldehydes and ketones also are easily reducible to the corresponding alcohols, and, naturally, a material containing unsaturated linkages comes out as a saturated alcohol. When using copper as the catalyst, and copper is apparently the most useful, there is no need of special reduction before its use in the catalysis, as the temperature employed in the process is well above that needed to reduce the copper compound to the metallic form. The pressure employed is roughly critical in one direction; below certain pressures, the reaction seems to proceed in other definite and undesired directions. The yields may be as high as 8.97% (this in the case of palm oil).

In theory, the first step which takes place is the formation, by addition, of a semi-acetal, from this an ether, and finally the alcohol desired, then, if not stopped, the hydrocarbon corresponding. The semi-acetal may in some cases be split at once into two alcohols, or, again, the ether-salt first formed by addition of hydrogen may break up into an alcohol and an acid, which latter is then reduced to the alcohol. Any of these reactions is at least possible, according to the conditions adhered to. It is an interesting fact that glycerol passes to propyl alcohol, in this process.

As to the applicability of the higher alcohols to textile operations, the alteration of physical properties, as the molecular weight rises, leads to a point at which the products are neither really solid or liquid. Below such a point the alcohols assume this condition at a higher temperature, above it they assume this condition at a lower temperature —which enables us, by selection of the proper alcohol, to adapt its use to an operation which will, for other reasons, proceed best at a given temperature-range. Particular reference is here made to the possibility of establishing the condition of dispersion and lipophilism. The alcohols do not exert these powers unless in solution, or in an emulsified condition. As they are not soluble in water, they are incorporated into such substances as soaps, sulfonated oils, etc. With such mixtures, however, it is not easy to obtain solutions which are perfectly clear, if the alcohols are of a high molecular weight. E. g., Turkey-red oil and decyl alcohol form a clear liquid, which, when diluted, is an emulsion; the same mixture, using lauryl alcohol, gives upon dilution a semi-pasty clear white liquid. The higher alcohols, when prepared by treating them above their melting-point with soaps or sulfonated oils, or by dissolving them in such solvents as the lactic acid esters, form pastes of the consistency of medicinal ointments, and these emulsify well when diluted with water. Such preparations in general possess the power of taking up considerable amounts of hydrocarbons, and of emulsifying these when the mixture is diluted with water. Even paraffine, if incorporated into such a paste above its melting-point, is perfectly emulsified upon dilution, thus making its valuable properties in finishing quite available without difficulty.

Beside being employed thus, the alcohols, by virtue of their hydroxyl groups, can be converted into such derivatives as the sulfuric acid esters. Such esters possess properties which in some cases are more valuable in textile work than any other agents as yet known. The sodium salt of the sulfuric ester of stearyl (octodecyl) alcohol is of the greatest value in brightening artificial silk as well as cotton. The new property imparted to the alcohol by conversion into this sort of ester may be described as that of a hydrophile, the property of dissolving well in water, as well as displaying an affinity for materials wetted in water, being in its properties added to the colloid properties of the nucleus of the molecule. The substances behave, in fact, like genuine soaps, only more vigorously so in character. A further advantage of such ester-salts is, that they do not suffer hydrolysis upon solution in water, the production of an alkaline reaction being thus avoided. They possess a strong penetrative power, the compounds of the higher alcohols being more notable in this point. In addition, such ester-salts are not affected by hard water (lime soaps are not formed and precipitated upon the goods) nor by acids of medium concentration. One has only to think transiently of true soaps in this connection, to perceive what is involved.

Still further, such sulfonic acid esters can easily be transformed, by reaction with sodium sulfite, into true sulfonates of the hydrocarbon radical. These sulfonates form perhaps the most highly developed group of assistants. Unlike the common "sulfonated" oils, they are quite stable even in the presence of strong acids, thus making their use possible even when woolen goods are to be carbonized later. In some cases, however, this great solubility is not an advantage, as they are, even the highest members of the group, very soluble in water, and therefore can be removed in washing when their retention would be desirable.

Still other derivatives have been prepared and examined; the chlorides of the hydrocarbon radicals, aromatic alcohols and phenols, in the form of esters or sulfonates, and even such strange compounds as ethyl stearate sulfonated in the ethyl radical, etc. Such various substances display the widest range of properties, sometimes valuable, sometimes valueless but interesting and suggestive; but the properties, varied as they are, can usually be more or less correlated with the properties generally recognized as inherent in the various groups and linkages present.

Vat Dyeing of Vegetable and Animal Fibers

German Patent No. 454,493 (24/*VIII*/'28)—*Kalle and Co. A. G.*—Consists solely in the use of naphthoquinone-2-3-carbozole and its derivatives, which dye in brown tones, pure and reasonably fast.

The naphthoquinone-carbazoles are in general vat dyestuffs (see G. P. No. 399,698). They dye wool and cotton in brown tones. They are not sufficiently fast to be of high value, but assume a greater fastness on being first converted to their anilides, which still, however, are not pure in tone. The 2-3-compound, however, is satisfactory without being further worked up.

Vat Dyestuffs (Yellow) (Anthraquinone Series)

German Patent No. 466,810 (11/*X*/'28)—*I. G. Farben-Ind. A. G.*—German Patent No. 167,461 describes a brownish-yellow compound derived from 1-hydroxy-anthraquinone by fusion with caustic alkali. The present patent covers the vatting of this with hydrosulfites, and dyeing any kind of fiber, from a weakly alkaline vat, in strong yellow tones. Ammonia water may be used as the alkali. The dyeings are stated to be very fast to washing, decatizing, and light.

Two examples are given.

OPEN FORUM

Rules under which this department of the REPORTER is conducted are as follows:

1. Anyone who has a technical problem on which he would like advice may submit it to the Reporter and it will be published in the first available issue.

2. Any reader who feels that he has a solution of the problem may forward his reply to us and if we feel that the reply is suitable it will be published in a succeeding issue.

3. For each such reply published the Reporter will pay a minimum of $2.

4. In case there is more than one answer to the same question, the one covering the subject in the most complete and authentic manner will be published, or if two answers are sufficiently different both will be published. If two answers are considered equally good, the one first received will be given priority.

5. The Reporter will assume no responsibility whatsoever for the accuracy of the answers submitted—it is simply offering a vehicle for the public expression of its readers' opinions.

6. Both the questioner and answerer must send in his complete name and address. When requested we will publish only the initials or other identifying insignia.

Answer

14—Can you give me any information regarding what has been done in the development of ramie for use as a textile fiber? Do you think there is any market for it and for what uses is it particularly adaptable?—R. M.

Answer:—Although ramie is a very strong fiber it has several drawbacks which condemn it for general use in the textile field. One of these is the lack of uniformity in the fiber and the other is its lack of flexibility. The first of these faults is due largely to the method of cultivation or rather the lack of cultivation By a definite program of cultivation extending over a period of years it might be possible to improve the stock sufficiently to warrant a more general acceptance of the fiber for textile needs. The stiffness of the fiber may be reduced by strong chemical treatment but this will deprive the fiber of its one outstanding virtue —its strength. It is a question whether the expense of time and money involved will ever show a return on the investment. It will make the fiber so costly (presuming that the experimentation proves successful) that it will not be able to compete successfully with the other fibers. Many attempts have been made to commercialize the fiber but they have generally proven unsuccessful. The extent to which ramie is used in the industry today is practically negligible. An outline of the processes used in the manufacture of ramie, as given in "Textiles" by Barker follows:

Processes of Ramie Manufacture

1a.—Decorticating usually on plantation while stems are green.

1.—Boiling with caustic soda, etc.

2.—Bleaching—ordinary method.

3.—Washing.

4.—Hydroextracting.

5.—Heat Drying—without confusion of "fiber bundles".

6.—Roller-softening. Through rollers—6 inches forward, 3 inches backward, etc.

7.—Carding and fiber cutting process. 18 combs. Cuts at 7¾ inches.

8.—Dressing between 32 books on flat dressing frame with stripping drums.

9.—Spreading or gilling (intersecting gills). Lap-drum 3 feet in diameter. Ratch—11 inches to 12 inches. Fallers occupy space of 8 inches. Two passages.

10.—Gilling (ordinary). Ratch 11 inches to 12 inches. Fallers occupy space of 8 inches.

11.—Drawing on open-gill—4 heads. Ratch 11 inches to 12 inches. Fallers occupy space of 8 inches.

12.—Roving on 40 spindle frame. 1 sliver up. Ratch 10 inches to 11 inches. Fallers occupy space of 7¼ inches.

13.—Doubling on 60 spindle frame. 2 to 4 slivers up. Carriers in place of gills.

14.—Hot water spinning on 300 spindle ring frame. Ratch of 10 inches.

15.—Dry twisting on 272 spindle ring frame.

16.—Gassing on gassing frame.

17.—Reeling.

18.—Bundling.

—S. V. W.

New Question

19.—In earlier editions of the Open Forum, Question No. 4, inquiry was made in regard to the use of Potassium Permanganate for certain processes of bleaching and dyeing.

Two different answers to this question were published in the May 21, 1934 edition of the DYESTUFF REPORTER. As far as I can observe, neither of these answers refer to the possible use of potassium permanganate in the bleaching of wool material and rayon. I assume that the bleaching of viscose rayon would be similar to the bleaching of cotton, but I am not sure how it would work with acetate rayon. If anyone has unsuccessfully tried to apply it for any of these purposes, I would be interested in learning why it was rejected.

Further replies along this line will be appreciated.

● MARKET

The Union of South Africa continues an important and growing market for American chemicals and allied products due to improved purchasing power of the South African pound in terms of dollars and to better domestic conditions, according to C. C. Concannon, Chief, Commerce Department's Chemical Division.

Imports of such products from the United States increased 46 percent to a total value of $1,444,000 in 1933 compared with the preceding year and made up more than 6 percent of the Union's total purchases of American goods and 10 percent of its chemical purchases from all sources. This increase was due in part to exchange and in part to larger quantity purchases, it was stated.

Paint products, consisting chiefly of cold water and ready mixed paints, led the list of purchases from the United States with an increase of 70 percent to a total value of $317,670; followed by medicinals which increased 59 percent to $234,600; insecticides and disinfectants, $162,700—showing little change from the preceding year; and toilet preparations, including perfumery, $132,000, but not including toilet soap which accounted for an additional $172,000. Other important items of chemicals and allied products imported from the United States included turpentine, $82,000; mineral spirits, $95,000; sulfur, $92,000; and vaseline and polishes.

Reports from South Africa indicate that conditions are improving steadily in the Union, particularly with gold and diamond mining and to a lesser extent with agriculture, Mr. Concannon stated, and that American exporters of chemicals as well as other products might look to increasing business in that area.

Imports of diamonds into the United States during the first half of 1934 increased 60 percent to a total invoice value of $7,000,000 compared with the first six months of the preceding year. The United States is the largest ultimate purchaser of diamonds and the bulk of them is mined in South Africa.

Yellow Dyestuffs for Acetate Silk

German Patent No. 468,981 (24/XI/'28)—*I. G. Farben-Ind. A. G.*—Azo dyestuffs derived from diphenylamine, with a nitro and a sulfonic group at various points within the molecule, are known, but those thus far tried upon acetate silk have shown little affinity for the fiber, and the dyeings are too light. Those dyestuffs produced by coupling a nitro-diazo salt to diphenylamine-sulfonic acids, on the other hand, yield stronger dyeings upon acetate silk, but, as far as they are yellow dyestuffs, their value also is low, as the dyeings are either phototropic, or not very fast to light, or are not fast to acids. In the present case, the dyestuffs cited contain at least one nitro group in the diphenylamine residue of the product, the sulfonic acid group being in either half of the molecule (i. e., in either the first or the second component); for example, such a dyestuff as is obtained by coupling diazotized aniline to 2-6-dinitro-diphenylamine-4-sulfonic acid, the substituent groups being in this case all in one of the two diphenylamine rings, which would in some cases be necessary, in order to allow for coupling to take place in the other ring.

O-Hydroxy-azo-Dyestuffs

German Patent No. 462,212 (6/VII/'28)—*I. G. Farben-Ind. A. G.*—The point of this patent lies in the utilization of a hitherto unknown substance, 2-8-dihydroxynaphthalene-6-carbonic acid, obtained by sulfonating 2-naphthol-6-carbonic acid and fusing the product with caustic alkali. When this new product is used as the second component, being coupled to by o-hydroxy-diazo salts, it yields valuable mordant dyestuffs, which dye level, and are very fast to potting, fulling, and decatizing.

Four examples are given; brown going over to black by afterchroming, olive, brown, and blackish-green.

CLASSIFIED

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POSITION WANTED—By Philadelphia Textile graduate 31 years old, married, protestant. Experience—At present and for past 6 years, boss dyer in large plant using wool, cotton, rayon and acetate fibers; 2 years apprentice learning wet and dry finishing; 1 year apprentice at wool sorting,—also summer work in dyestuff laboratory. Would like position with opportunity for advancement. Write Box No. 832, merican Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

WANTED—Reliable European shippers of industrial chemicals for dyers' want agent for sales in U. S. A. Reply Box No. 833, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED—Dyer with 10 years' experience silk hosiery and rayon piece goods dyeing. Also capable of handling the dyeing and bleaching of straws. Eight years in own dyeing business. Good knowledge of German and textile chemistry. Age 27, American. Any location. Write Box No. 834, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.